PAPER TRADE JOURNAL

VOL. 123, NO. 14 OCTOBER 3, 1946

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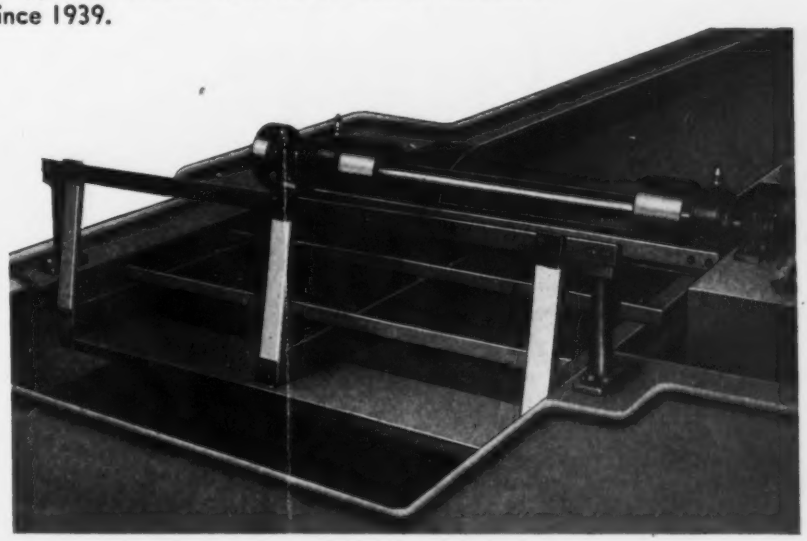
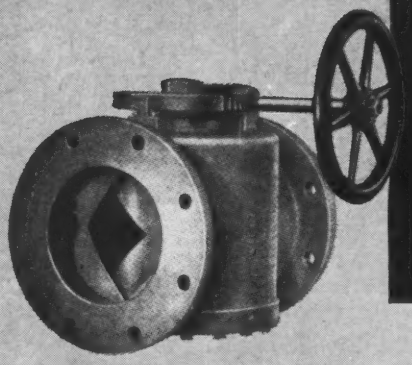


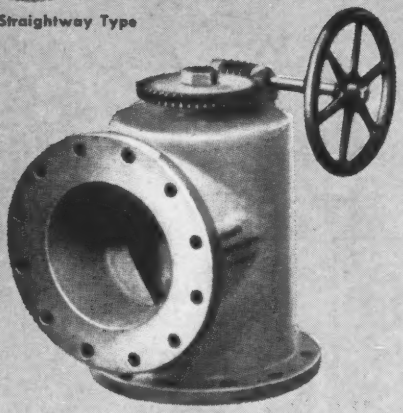
THE SANDY HILL IRON & BRASS WORKS
HUDSON FALLS, N. Y.

$18 Million Newsprint Mill Details Are Outlined to SNPA
Howard Morgan Succeeds Wolf at Weyerhaeuser
Fowler Says Canada Will Hold Its Prices Close
Bowaters Addition Aims At 300,000 Tons
Milwaukee Journal Buys Interest in Peavey Mill
New England Mills Face Freight Car Shortage
Marathon Appoints Rawson at Menominee
Wisconsin Mills Join in Waste Use Project

PACKING*LESS*
Stock Regulating Valves
Non-Plugging



Straightway Type



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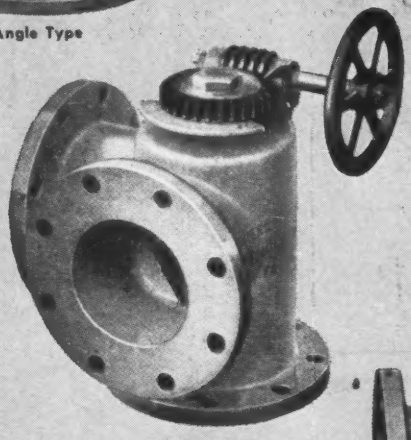

Side Outlet Type

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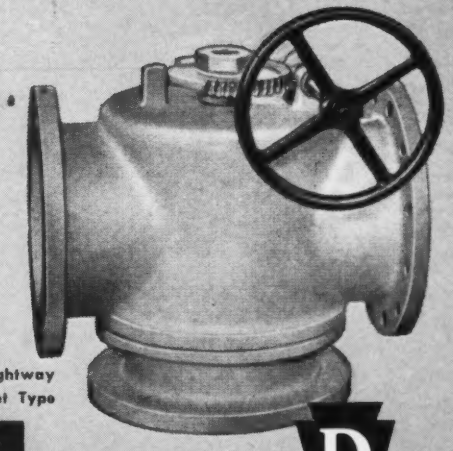

Straightway Outlet Type

DOWNINGTOWN
Designers & Builders
Paper Making Machinery

For index to Vol. 123, see Vol. 124, No. 6, Feb. 6, 1947. Pages 41-44.

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ioneer of the wood pulp industry, Matthias
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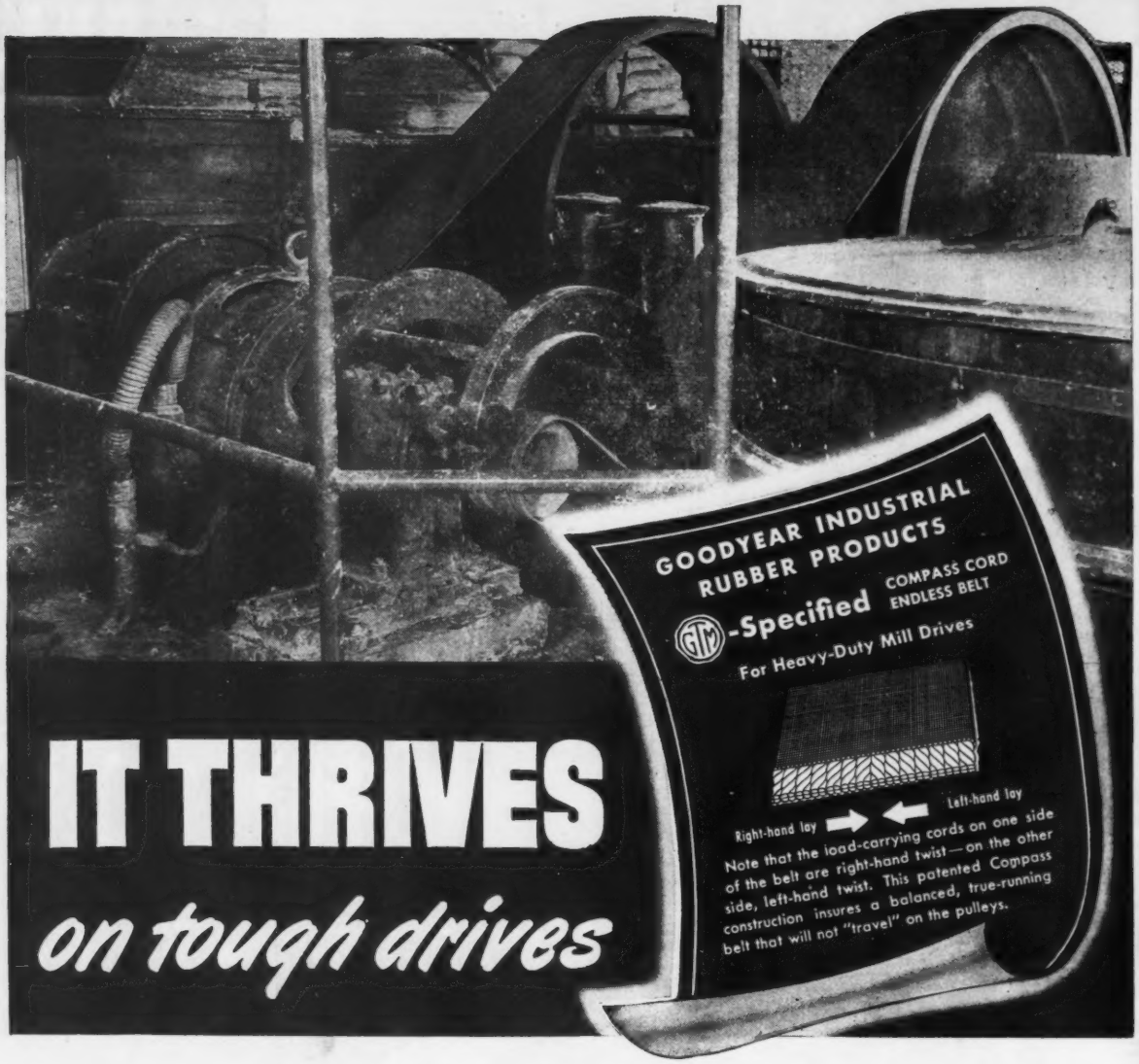
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For Heavy-Duty Mill Drives
Right-hand lay
Left-hand lay
Note that the load-carrying cords on one side of the belt are right-hand twist — on the other side, left-hand twist. This patented Compass construction insures a balanced, true-running belt that will not "travel" on the pulleys.

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PAPER TRADE JOURNAL

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Established 1872

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WHETHER YOUR PUZZLE IS PAPER CONVERTING, HEAT SEAL OR ADHESION—ARCC HAS A RESIN FOR IT

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Bearings, contaminated with carbon, were causing a heavy drag on a machine in a big Eastern mill. Jerky operation, accompanied by power losses, were the result. Too often bearings failed, necessitating emergency shutdowns.

The jerks disappeared after a Sun Engineer recommended a "Job-Proved" Sun oil developed especially for paper mills. The Sun oil lubricates bearings perfectly. In fact, not one bearing has failed since adoption of this Sun lubricant.

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PAPER TRADE JOURNAL
Vol. 123, No. 14 October 3, 1946
Title Reg. U. S. Pat. Off.

Fowler Says Canada Will Hold Prices In

MONTREAL — In spite of fabulous prices being paid for newsprint from Scandinavian countries in the paper-starved world outside North America, the pulp and paper industry in Canada is maintaining the more restrained price policy it always has adopted, R. M. Fowler, president of the Newsprint Association and of the Canadian Pulp and Paper Association, declared this week in an interview.

He referred to a statement made in Montreal by Sir Eric Vansittart Bowater, president of the Bowater Paper Company of England and of the Bowater Paper Mills in Newfoundland, that a price above $85 a ton would not be in the economic interest of the paper industry.

Mr. Fowler said many countries offered to pay more, but the price to American publishers was fixed at $74 by the OPA, and Canadian publishers had always benefited by the historic differential of $4 a ton less than the New York price.

Most of the production of the Canadian mills, which operated 99 per cent of capacity in August, was cared for by contracts, but Canadian papermakers were trying, through constant efforts at improvement in efficiency, to produce some paper for shipment to countries overseas.

Mr. Fowler said he did not believe that plant extension by Canadian mills was economically justified.

"Costs have more than kept up with improved prices, and the real problem is maintaining the wood supply and thus maintaining production. Some of the mills are already scratching for wood.

"Last year prisoners of war cut 31,000,000 cords of wood in the Great Lakes area. Now they have gone back. That means a very acute situation in that area."

In Quebec the situation "seems to be one of promise, but the real test would come in October when the large bulk of labor will be required to get the camps operating.

"The problem is going to be one of cutting, and not stopping around Christmas time, as has been the habit. If there is snow, or an early spring breakup, it means that the last 10 per cent which is really the essential thing in all wood operations, will not be cut, unless the camps carry right through."

He said the output of newsprint in the United States had gone down from 1,750,000 tons to some 600,000 a year because the wood was being used for book and magazine paper instead of newsprint.

Zellerbach Names Mostman To Post in New York

NEW YORK—Appointment of M. R. Mostman as merchandising manager of the New York office of the Zellerbach Paper Company, has been disclosed by King Wilkin, assistant to the President and General Sales Manager. Mr. Mostman will be the New York representative of the printing paper, wrapping paper and resale merchandising departments of the Zellerbach Paper Company, the executive offices of which are in San Francisco.

Mr. Mostman, who transferred to the Zellerbach Paper Company from the Sanitary Products and Paper Company, a division of the Crown Zellerbach Corporation, was manager of Sanitary's Pittsburgh Division prior to the war. During the war years he was on leave of absence serving as a Major in the Chemical Warfare Service, and his Army career was marked by a tour of duty in the Burma Theatre.

M. R. MOSTMAN

$18 Million Mill and Decontrol Feature Edgewater Program

EDGEWATER PARK, Miss. — Plans, long under preparation, for a newsprint mill at Childersburg, Ala., were reported complete this week at the annual meeting of the Southern Newspaper Publishers' Association here. The mill will cost $18,000,000, and will have a capacity of 100,000 tons a year, Clarence B. Hanson jr., chairman of the newsprint committee, said in outlining the new project. The mill is to be operated by Coosa River Paper Company, of which T. W. Norton, of Birmingham, is president. Donald Comer, Alabama industrialist, is chairman of the board.

The Association adopted a resolution favoring removal of Government price controls on newsprint. The action was taken after W. G. Chandler, president of the American Newspaper Publishers Association, in an address before the convention advocated decontrol of newsprint.

Mr. Chandler reported on the newsprint situation in the United States and the results of a careful survey made by the special newsprint committee of the American Newspaper Publishers Association. Mr. Chandler warned that print paper supply, for several years, will be materially diminished by its diversion to other markets unless manufacturers are free to charge, and the publishers free to pay, an adequate newsprint price.

"You may well ask at this point if we are in a free market, whether we will have a runaway price that characterized the short period in 1920, when the market price of newsprint reached $130 a ton for the quarter of a year," he said.

"Speaking from long years of dealings with United States, Canadian and Newfoundland manufacturers," he continued, "I accept their unqualified assurance that, barring general inflation, they will protect their long-term interest in maintaining a market price which publishers can afford to pay. They are determined to the limit of their powers to eliminate the possibility of a spot market or a black market."

Mr. Chandler said the publishers have a choice of trusting the suppliers with whom they dealt for many years

(Continued on page 12)

Bowaters' Aims At 300,000 Tons Yearly

MONTREAL — An expansion program scheduled for completion by early 1948 will give Bowaters Newfoundland Pulp and Paper Mills Limited plant at Corner Brook annual production around 300,000 tons of newsprint plus over 50,000 tons of sulphite pulp. Entire output has already been contracted for for ten years ahead, states Sir Eric Bowater, company president, who recently arrived to inspect the plant. Operating at near capacity throughout 1945, it produced over 186,000 tons, with groundwood pulp production for export at 7,300 tons.

To supply the increased needs of the mill and, in addition, the Bowaters Kemsley mill in England, an annual cut of 600,000 cords of spruce and balsam fir pulpwood must be maintained. To achieve this record cut, increased logging facilities and many new camps will be necessary, with the attendant improvements in cutting, handling, barking, stacking and shipping.

Major item in the mill expansion project will be installation of a sixth high-speed newsprint machine, to operate at a record 1,750 feet a minute, producing a sheet of 266 inches trim width. Contract for this machine has already been placed with the Dominion Engineering Co. of Montreal, with delivery tentatively set at late autumn of 1947.

But the increased production will not be wholly provided by the new machine. The five existing newsprint machines, with speeds from 800 to 1,200 feet per minute, will be stepped up to produce an additional 15,000 tons a year. Capacity of the sulphite pulp machine will be increased from 40,000 to 55,000 tons of baled sulphite pulp yearly.

To provide the necessary pulp to feed the new machine and the increased output of the existing ones groundwood pulp production will be increased accordingly. Eight new Waterous magazine type, automatic-feed grinders, with 72-in. stones, will be installed in a further addition to the grinder building. These eight grinders will have a daily capacity of 280 tons of unscreened pulp. For further processing of groundwood, three new coarse screens, four new Cowan-type fine screens, and eight filters of two types will also be installed.

To accommodate the new machines and equipment, several additional mill buildings will be erected; some to replace older buildings to be demolished, others to house the additional equipment. These include the new grinder building, new screen room, new power substation, a large new machine building, and additions to several existing buildings for handling groundwood pulp production.

The plant expansion program extends beyond the confines of the mills proper. Sulphur storage will be increased, and new sulphur handling equipment and bark disposal equipment will be installed. Extensive changes in the mill electrical equipment will be necessary. Expansion of woods operations also will be undertaken, with improved methods of handling logs from the woods storage locations to the barking barges and log booms on the larger rivers and lakes.

There has been a steady increase in production at the Bowaters mill in the past year, in spite of shortages of equipment and supplies. A few weeks ago a daily record of over 700 tons of newsprint was established, termed evidence of what can be accomplished by a concern which is not troubled with strikes or slow-downs because of poor labor-management relations. The company operates a major portion of the town of Corner Brook, with its own homes, hotels, stores and other public buildings.

An additional 150 men will be employed in the mill for operation of the new machine, and another 1,000 or more will find permanent employment in the woods, as the result of increased logging operations. Recent wage increases to employees added another $1 million to the annual payroll of the company, and it pays the highest wages in Newfoundland for both skilled and unskilled labor, comparing favorably with the highest paid to pulp and paper mill workers in Canada.

Total cost of the mill expansion and increased logging operations will come close to $10 millions, to be spread out over a two-year period. Orders for most of the heavy machinery units and equipment have already been placed, in Canada, the United States, and the United Kingdom.

Wolf Retires at Weyerhaeuser; Howard Morgan Succeeds Him

R. B. Wolf, Manager of the Pulp Division of Weyerhaeuser Timber Company since the company's first pulp mill was built in 1931 has announced his retirement effective May 1947. He will be succeeded by Howard W. Morgan, who is resigning October 1st as vice-president of the Munising Paper Company at Munising, Michigan.

Mr. Morgan has had broad experience in the manufacture of both pulp and paper and is well qualified to carry on the Weyerhaeuser Timber Company's growing activity in the wood pulp field.

British Columbia Employment Rises

VANCOUVER, B. C. — Twelve companies engaged in the pulp and paper industry in British Columbia during 1944 had a total payroll of $9,449,766, according to a report recently issued by the labor department. This was an increase of $722,657 over the 1943 figures. Average full week's wages in the industry in 1944 was $37.71, compared with $36.41 in 1943. Back in 1937, the average was only $26.75.

Ward Group Plans West Coast Mill

VANCOUVER, B. C.—Plans are now well advanced by the Columbia Development Company, Limited, for the erection of a new pulp mill in British Columbia. This is a firm of pulp industry consultants which is at present working on the plans for a new mill for British Columbia. No details have been released as to who will build the mill, nor indeed regarding any of the other pulp and paper mill development projects which are now being drafted by the company.

Head of the Columbia Mill Development Company is Squadron Leader A. M. Ward, who had had twenty years' experience in the pulp industry. Ward served with Price Brothers and Company, Limited, Quebec; Dominion Engineering Company, Limited, Paper Division, Lachine; Charles Walmsley Company of Montreal and Bury, England. He has visited mills in Scandinavian countries and the southern U.S.

Vice-president is J. R. Dunbar, inventor of the Dunbar screen drive and other patented inventions used in the pulp industry. A. C. R. Yuill, of Vancouver, is consultant and director.

Chief engineer and general manager is S. C. Rooney, formerly with Wateous Limite, The Aluminum Company of Canada and the British Columbia Pulp and Paper Company.

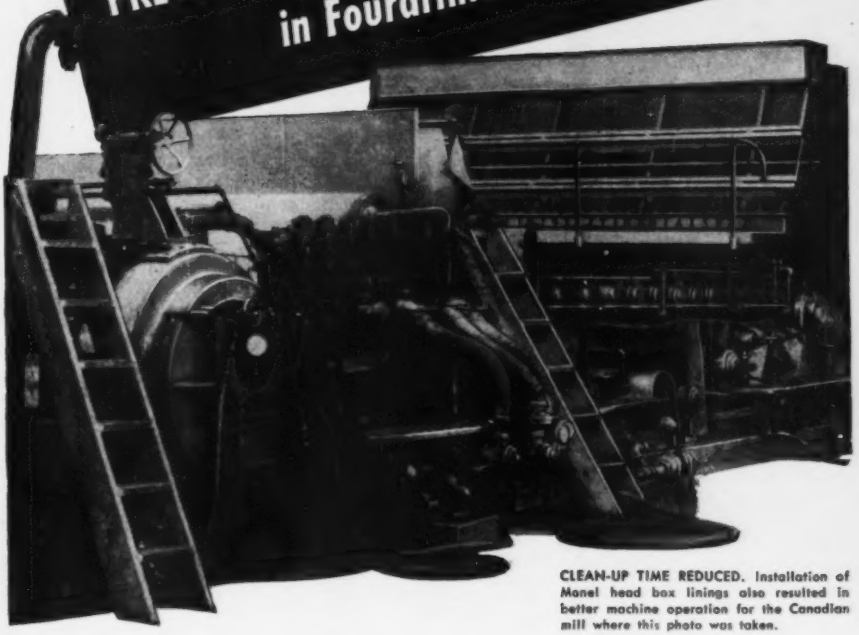
The company has just completed estimates for a new board mill, and a pulp mill, to be constructed in Saskatchewan.

Brightwater Force Welcomes Veterans Back to Work

ADAMS, Mass. — Three hundred employes of the Brightwater Paper Company attended a clambake Sunday at Wenzel's Grove in Adams. The affair which was in the nature of a celebration for returned war veterans of the company was sponsored by Local 12796 of the United Mine Workers and the plant management. Among the guests were representatives of the Boston, Albany, N. Y., and Springfield offices of the union.

One of the features of the afternoon was the catching of a greased pig, with over 50 persons participating in the event. A baseball game between the finishing room and the repair shop was won by the finishers. The 100-yard dash for married men was won by John Pitoniak; the sack race for married women by Mrs. Elizabeth Volpi; peanut race, Grace Crandal; 50-yard dash, Ugo Balardini; corn-eating contest, John Lawson; stake-driving contest, Paul Clairmont; 25-yard dash for men over 65, Thomas Chalmers; apple race, Joseph Curtin; fat men's race, Jack Trimble; and shoe-lace race, Frank White. During the evening dancing was enjoyed, with music furnished by Frank White and his orchestra.

PREVENT SLIME and STOCK ACCUMULATION in Fourdrinier Wet Ends



CLEAN-UP TIME REDUCED. Installation of Monel head box linings also resulted in better machine operation for the Canadian mill where this photo was taken.

RELINING THE CYPRESS WOOD head box. Monel sheets were overlapped one inch at the edges, then fastened to the wood with *Anchorfast* Monel nails.

LOOKING IN on the finished job. These shiny, corrosion-resistant Monel surfaces will stay smooth . . . free from slime and stock accumulations.

CLEANING the head boxes on these machines was once a laborious job.

But not any more. The boxes have been relined . . . *and this time with Monel**.

Read what the Paper Machine Superintendent of this prominent Canadian mill now reports:

"Very little effort is needed on clean-up days to keep the Monel linings slick and clean . . . all that seems necessary is to wash the walls down with a fresh water hose."

That's just about all there is to it. And here's why.

Monel resists corrosion and pitting by paper stocks and white waters. The surfaces stay smooth, never give slime and fibre accumulations a chance to dig in and hang on. Clean-up days are always easy days, for acid cleaning and hand-scraping aren't necessary.

First used in this mill in 1944, Monel head box linings performed so satisfactorily that additional Monel linings were installed last year. As strong and tough as these shiny, corrosion-resistant linings are, installation was a simple job. Monel is readily bent, formed and shaped. It is easily cut and machined, and can be welded, soldered or brazed by commonly used methods.

A metal with Monel's characteristics has many uses in wet machines and in other types of pulp and paper mill equipment.

PRINCIPAL USES OF MONEL ON FOURDRINIER WET ENDS†

Apron Plates
Belts & Other Fastenings
Brace Rods
Cross Braces
Breast Rolls
Dandy Rolls
Distributor Rolls
Doctor Blades & Backs
Flow Boxes
Flow Box Midfeathers
Rails
Rectifier Plates
Remover Beams
Remover Cross Drive Shaft
Save-All Trays & Pans
Shower Pipes & Nozzles
Side Beams
Slice Blades
Suction Box Covers
Suction Boxes
Table Rolls
Wire Return Rolls

†Under exposure to corrosive conditions generally encountered in Fourdrinier wet ends, Monel is safely used in combination with brass and copper parts.

THE INTERNATIONAL NICKEL COMPANY, INC., 67 Wall St., New York 5, N. Y.

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*Reg. U.S. Pat. Off.

New England Faces Freight Car Tie-up

BOSTON — Frank J. Gill, traffic manager of the Oxford Paper Company, Portland, Me., speaking at a conference of the New England Shippers Advisory Board at the Hotel Statler last Friday declared that the crippled freight facilities would soon be called on to handle a Maine potato crop of 71,000,000 bushels, exceeding the crop of last year by 18,000,000 bushels. He said that there would be also increased shipments of bricks, lime, cement, stone, building materials and machinery.

It was brought out at the meeting of nearly 600 shippers and receivers of freight that increasing production forecast in 26 branches of New England business may be stalemated by a severe shortage of railroad freight cars that is already hampering the industry of this region.

J. W. Smith, vice-president of the Boston & Maine Railroad, disclosed that 505 empty box cars must now leave New England each day to relieve the freight jam in other sections of the country in compliance with an order of the Office of Defense Transportation.

William H. Day, general chairman of the board, charged that some business concerns that load and unload freight only at specified hours were intensifying the situation by tying up loaded cars and using them as storehouses.

Warren C. Kendell, of Washington, chairman of the car service division of the Association of American Railroads, warned that embargoes might have to be laid on business concerns that were continually tying up the scanty supply of freight cars.

Scott Names Eckert To Detroit Post

CHESTER, Pa. — George Eckert has been promoted to the important post of Detroit Industrial Division manager of Scott Paper Company by Industrial Sales Manager George Swatek. Mr. Eckert, who observes his tenth anniversary with Scott this month, has had a vast amount of experience with the sale of the company's industrial products and is regarded as a splendid choice for this key position.

On September 22, 1936, he began his career with the company as an industrial sales assistant in Philadelphia. A year later he was made Wilmington district manager. His sales history broadens tremendously from this point.

Three North Country Mills Advance Wage Scales

OGDENSBURG, N. Y. — General wage increases have been negotiated between the International Brotherhood of Pulp, Sulphite and Papermill Workers, A.F.L., and three north country manufacturing companies, it was announced by Floyd C. Van Dusen, field representative of the union.

The Cleveland Container Company of Ogdensburg and Local 534 of the Brotherhood negotiated a general raise of five cents an hour. Negotiations between Local 121 of the Brotherhood and the Dexter Sulphite Company of Dexter resulted in a general increase of nine cents an hour. A general wage increase of seven cents an hour was agreed upon by Carthage Papermakers, Inc., at Carthage and representatives of the Brotherhood.

Shortage Headlines Midwest News

CHICAGO—The importance of paper and the shortages that plague it were brought home to millions of mid-westerners this week when the news came out that there might not be enough paper available to print next year's income tax blanks! Reports here indicated that public printer Augustus E. Giegengack was genuinely disturbed over the situation although income tax experts—possibly bent on having some work to do regardless—were far less pessimistic about the outlook.

The market has been giving a fair indication that the public printer knows what he is talking about. All grades of paper were in strong demand despite capacity production on the part of the mills. Some jobbers reported more difficulty in getting mimeograph papers than they had encountered for some time. Book papers were likewise reported scarce as the entire market bumped along at ceiling prices. Waste papers were reported to be in good collection, with splendid weather helping. However, said waste paper men, there continued to be a great deal of uncertainty and hesitancy in this market traceable to OPA factors and other problems.

Milwaukee Journal Buys Share In Peavey Mill at Ladysmith

LADYSMITH, Wis.—Joint announcement was made here and in Milwaukee September 26 that The Milwaukee Journal has purchased a minority interest in the Ladysmith mill of the Peavey Paper Mills, Inc. The Peavey company, as soon as equipment changes can be made, will manufacture newsprint for The Journal as well as to continue its production of toilet tissues. William Peavey is president of the mill and Harold Peavey is vice-president in charge of sales.

Perry Goes to Chemical Paper

HOLYOKE, Mass.—Freeman Perry of Manchester, Conn., has been appointed chief chemist at the Chemical Paper Manufacturing Company. Mr. Perry is a graduate of McGill University and has been a chemist at the Lydall & Foulds paper mill in Manchester.

Wisconsin Mills Join In Waste Use Projects

APPLETON, Wis.—Organization and incorporation of two companies as an outgrowth of a cooperative research program inaugurated in 1939 by a group of sulphite pulp producers operating 13 mills in Wisconsin and 1 in Michigan was completed last week. Both companies will exploit new processes for the manufacture of by-products from sulphite waste. Incorporation of a third is understood to be under consideration. One on the new companies is the Lake States Yeast Corporation and the other is the Sulphite Products Corporation.

Disclosure of the formation of the Yeast company was made Saturday, September 28, by John G. Strange, secretary of the Institute of Paper Chemistry here; that of Sulphite Products was revealed earlier in the week when articles of incorporation were filed at the office of the secretary of state at Madison, Wis.

The Lake States Yeast Corporation will erect a $400,000 plant on the premises of the Rhinelander Paper Company, Rhinelander, Wis., to manufacture yeast. It will be the first of its kind in America and, while similar projects in conjunction with other sulphite mills are under consideration, it is anticipated that their active prosecution will await results from the Rhinelander project, Mr. Strange said.

Spent cooking liquor from Rhinelander's pulping operations will be utilized in the process. At the same time there will be a material reduction in the stream pollution characteristics of this waste material and should result in considerable benefit to the Wisconsin river into which it is ultimately discharged.

Officials of the new corporation are: President, Folke Becker, president of the Rhinelander Paper Company; vice president, Stanton Mead, Consolidated Water Power and Paper Company, Wisconsin Rapids, and secretary and treasurer, John G. Strange.

Purposes of the Sulphite Products Corporation, which will have its headquarters in Appleton, will be to manufacture *and* develop "all kinds of products from waste sulphite liquor and other by-products of the pulp and paper manufacturing industry," under methods discovered by joint research efforts sponsored by Wisconsin paper manufacturers and the state department of sanitary engineering at the Institute of Paper Chemistry, Appleton.

The articles of incorporation were signed by A. B. Hansen of Northern Paper Mills, Inc., Green Bay, Wis., John G. Strange, of the Institute, and H. A. Rothschild, of Kimberly-Clark Corporation, Neenah, Wis.

Capital was given as $30,000, presumably to be subscribed by the paper mills which have financed the research and experimental projects.

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This is one corner of our stock room, where we carry a wide assortment of Stainless Steel Fastenings, in all standard sizes and analyses. That's why we can give you prompt service on almost every order.

But this is only a part of the picture. We're pioneers in the manufacturing of Stainless Steel Fastenings. Our stockpile of raw materials is large, and we can produce the Fastenings you require, to your specifications, quickly and accurately.

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Anti-Corrosive Metal Products Co. Inc.

CASTLETON-ON-HUDSON NEW YORK

Newsprint at $85 Is Bowater Idea

MONTREAL—The price of newsprint should not be allowed to rise beyond $85 a ton, in the view of Sir Eric Vansittart Bowater, chairman of the board of Bowater's Paper Mills in London, England, and head of the Bowater Newfoundland Pulp and Paper Mills, who is spending a few days in Montreal after a three-week visit to Newfoundland.

"If newsprint does rise above that mark it is going to have an adverse effect on consumption," said Sir Eric. "There is every prospect of it going above the $74 which is the OPA price at present, sometime in the future, but when that will be I don't know. When they raised the last ceiling, the increase was the equivalent of what the Canadian newsprint producers were getting from American publishers before the Canadian dollar was adjusted. It therefore did not take into account the representations made by the newsprint people in favor of raising the ceiling to take care of the increased cost of production. So that application for a basic increase is still before the OPA."

The reason given for possible advances in the price of newsprint and paper was the increased cost of woods operations. Sir Eric said that improved conditions in the lumber camps would bring a better flow of men, who would demand a higher wage, and that, taking all things into consideration, was what they were entitled to.

Commenting on the fact that newsprint demand for consumption was greater than the supply, Sir Eric said that the newsprint companies were now in a sound position, and he was doubtful if a ten per cent reduction in consumption for the time being would convert a seller's market into a buyer's market. But he did think, as time went on, if it were extended to 20 per cent, it might convert the market, but he did not anticipate that happening.

"I think we have a five years run ahead of us at what I would regard as economic prices," said Sir Eric. He added that he hoped the $10,00,000 extension being made to the company's plant at Cornersbrook, Newfoundland, (which had been acquired from the International Paper Company in 1938) would be completed by the summer of 1948. That would increase the output of newsprint by 75,000 tons a year, bringing it to 300,000 a year; while the surplus sulphide production would increase by 15,000 tons a year, bringing it up to 55,000 tons.

Commenting on the size of Canadian papers, as compared with the British papers, Sir Eric said that starting today the English newspapers would be allowed to publish a six-page paper on three days a week and a four-page paper on three days a week, with eight pages on Sundays. He contrasted this with one paper published in Montreal on Saturday which had over 80 pages, each double the size of a British page!

"We are fighting and struggling to get more newsprint for these British newspapers and I think they are entitled to it," was his comment. "Our supply goes to Britain, to the United States, Australia, New Zealand and South Africa—we supply a world market, while Newfoundland is also an important source of supply of raw materials for our British mills, both in pulp and log wood."

Foxboro Builds in Canada For 1947 Occupancy

FOXBORO, Mass. — Foundation work is under way for the new plant which the Foxboro Company Limited is erecting on a three and one-half acre site in the Ville LaSalle section of Montreal. The completed building will be turned over to the owners in the Spring of 1947, ready for immediate occupancy.

The new plant, of brick and steel construction, will consolidate machining, metal finishing, and other basic operations, as well as the assembly and calibration of instruments, on one floor level. Adequate window area, as well as saw-tooth skylights facing north, will insure uniform light distribution. One department, specially air conditioned, will be devoted to the printing and storing of recorder charts. Ample provision is made for offices, shipping, receiving and storage departments. There will be a large, attractive room, equipped for meetings as well as for use as the employees' lunchroom and lounge. The plant site is adjacent to that of Peacock Brothers Limited, sales and service agents for Foxboro Instruments in Canada and Newfoundland.

The Foxboro Company Limited is affiliated with the Foxboro Company, Foxboro, Mass., one of the principal manufacturers of industrial instruments and a leader in developing the science of automatic control. The Canadian company, established in March 1933, now occupies extensive space in the Peacock plant buildings, but the steady growth of both the domestic and export business make it desirable to consolidate operations in larger quarters.

John H. Bolton continues as manager of the Foxboro Company Limited. He looks forward to the completion of the new plant and to the greater production and service facilities that will be provided for Canadian industry.

Henningsen Goes to Shanghai For Export Sales Group

VANCOUVER, B. C.—A. B. Henningsen has been appointed representative in Shanghai for Export Sales Company, which is the selling organization in the far east for the Powell River Company and Pacific Mills Ltd., both of B. C., as well as in a number of eastern Canada pulp and paper mills. H. J. McKenzie, manager of the Export Sales Company, is at present on a visit to Canada, and he and Mr. Henningsen have been engaged in visits to plants across the Dominion.

$18 Million Newsprint Mill Reported at Edgewater

(Continued from page 7)

or putting the supply future in the hands of Government officials.

"These officials," he pointed out, "are of necessity inexperienced and must consider the price problems of many groups and industries. They are bound by statute to permit no further increases in newsprint prices except as United States manufacturers, representing 20 per cent of our total supply, can show that their profits have been reduced or losses incurred at the present price level."

Eighty-odd per cent of the total supply, he added, came from manufacturers who were not bound by the OPA statutes or regulations.

"While it is a fact that successive chiefs of the OPA have consulted with representative groups of publishers prior to each necessary price advance, the fact remains that the machinery of government moves slowly," he continued. "Our present dilemma arises primarily because when Mr. Paul Porter, administrator of the OPA, called for consultation a group of representative publishers on June 14, these publishers left his office with the distinct impression that a $4 per ton increase in price, needed in their judgment for the continuation of supply, would be made effective.

"The action or inaction of Congress made it impossible for Mr. Porter to carry out whatever ideas he may have had," Mr. Chandler added.

Whiting Bulletin Features Cranes in Paper Industry

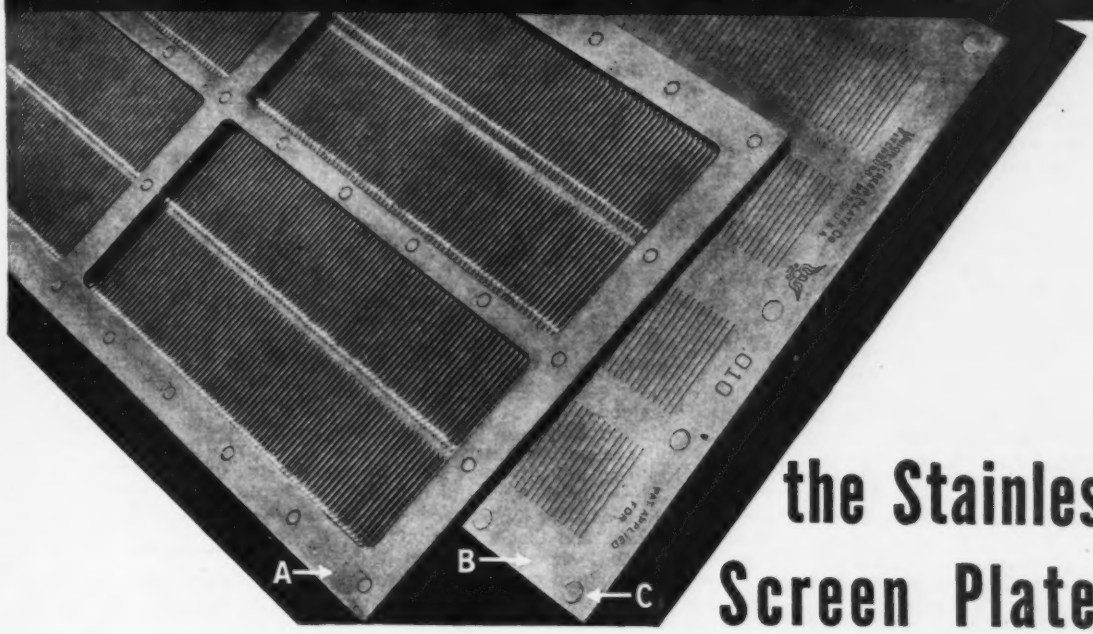
HARVEY, Ill. — The function of the Overhead Crane in factilitating smooth work-flow is the subject of a new bulletin, "Paper Handling with Whiting Cranes," just published by Whiting Corporation. Features such as quiet operation, roller bearings, and oil-tight gear housings—al important to paper men—are discussed. Special emphasis on the various kinds of grapples for handling different types of work are also described and shown in several of the bulletin's fifteen illustrations.

Copies of "Paper Handling with Whiting Cranes" will be sent free to any interested person upon request.

Manchester Force Votes For AFL Representation

ROANOKE RAPIDS, N. C.—In an election held here Wednesday, September 25, employes of the Manchester Board & Paper Company voted to become affiliated with the American Federation of Labor as a collective bargaining agency. Informed sources said a total of 54 out of 64 eligible employes endorsed the union in balloting. Seven voted against the move and three failed to vote.

* CORROSIST



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CONSTRUCTION: (See photo)

A. FRAME—Butt-welded Monel bars form an amazingly stiff back-bone, reduce flexing.

B. PLATE—1/8" Stainless steel, milled and sawed. Slot "breathing" held to the minimum.

C. RIVETS—Inconel for toughness, set home under 5 tons pressure per rivet.

STANDARDS:

CUT: 4 to 8 slots per inch, .008" and larger.

STYLE: C and E only, drilled or Witham bevelled.

THICKNESS: 3/8" only.

SIZE: 12" x 43" standard. 42" length on special order.

DELIVERY:

Production will start in October. Orders are being accepted now.

* Trade Mark

UNION SCREEN PLATE COMPANY
FITCHBURG, MASSACHUSETTS

Market Slump Leaves Paper Over V-J Level

TORONTO, Ont. — Although the pulp and paper group of common stocks has shown the second greatest percentage drop in the recent general recession since last May 30, the group is still among the nine groups still above levels of 13 months ago, according to the Dominion Bureau of Statistics index of 100 common stocks. The pulp and paper group holds the second largest percentage gain over the V-J levels, reflecting the higher price for newsprint.

There is keen interest in the position of Canadian pulp prospects. This interest was further stimulated when the OPA increased the price of domestic and imported woodpulp by ten per cent earlier this month. The U. S. pricing agency emphasized the increasing dependency of U. S. paper and board mills on Canadian woodpulp supplies. The figures show that the 1946 exports of Canadian woodpulp to the U. S. market will amount to approximately one-third of the consumption in that country. It also appears that Scandinavian countries will be able to supply only one-fifth of that market, while immediately before the recent war they supplied about one-third of the market. Expansion of U. S. consumption provides a market of 1.1 million tons annually for Canadian mills, which is approximately fifty per cent more than during immediate pre-war years.

Moreover, the increased production of U. S. domestic mills is not considered to be a permanent condition since part of it is based on subsidies now being given marginal and high-cost producers by the Reconstruction Finance Corp. It is assumed that as soon as demand slackens these subsidies will be discontinued. Swedish exports to the U. S. being down considerably on account of fuel shortages and other difficulties will also help the Canadian position. Many here interested in the Canadian woodpulp position point to the fact that the ten per cent increase in price and the $2 a ton freight rate adjustment accorded Swedish woodpulp, is offset by a revaluation of the Swedish Krona of approximately fifteen per cent, and the resulting reduction in net realization of Swedish producers may result in a sharp reduction in Swedish exports of wood pulp to the U. S.

All this seems to indicate that Canadian pulp and paper firms will realize about $10 million more than otherwise.

The recent market strength of Donnacona Paper Co., Ltd., common shares has given rise to much speculation. Various explanations have been offered, but the most persistent rumor has it that the Stern Publishing interests of Philadelphia are buying up this stock in order to guarantee their future paper supplies.

It is understood here that there is a possibility Quebec Pulp & Paper Corporation will resume operations soon. The firm has been in bankruptcy since 1942. Two offers for the assets of the company have been made by private interests, it is said, and that a decision will be announced shortly. Whether the proposed new mill on the site of the present plant will manufacture newsprint or woodpulp will not be known until Premier Duplessis announces which offer the province will accept.

Wilbur Joins Southern Board

SAVANAH — Roland Wilbur has joined the organization of the Southern Paperboard Corporation as manager of manufacturing. Mr. Wilbur spent several years with the Crossett Paper Mills in Crossett, Ark., as production manager.

Expansion Plans Hinge On Market Movements

CHICAGO—It was reported in some circles this week that plans of some companies in the paper industry to expand their plants and build new ones had taken a temporary set back because new financing has been made uncertain by the recent declines in the stock market. The news was considered somewhat serious because of unprecedented demands for paper and because of genuine shortages despite the fact that the paper mills are now running at a peak rate. Paper circles here point to big shortages in the book and cover stock lines even though the gap between supply and demand is continually being shortened. The trade here does not expect much help from the Swedish situation as long as OPA controls prevail and Swedish pulp producers can sell to European and South American markets at prices above the American ceiling. The expansion of several mills in Canada is expected to relieve the situation even as such expansion in mills in the United States would be of help if the uncertainty of the borrowing market does not become an actual drag, according to reports.

Gair Vice-Presidents Share Assignments

NEW YORK — At a meeting of the Board of Directors of Robert Gair Company, Inc., it was announced that Norman F. Greenway resigned as director and as first vice-president effective October 1. He will continue with the company as vice-president in charge of folding carton operations. On October 1, Sumner R. Cahoon became vice-president in charge of container operations and Herman Whitmore as vice-president in charge of boxboard operations.

FINANCIAL RECORD OF THE WEEK

New York Stock Exchange

High, Low and Last for Week Ending September 28, 1946

STOCKS

	High	Low	Last
A. P. W.	5⅞	5⅛	5⅜
Armstrong Cork Co.	47¼	44⅛	47
Celotex Corp.	29	25⅜	28¼
Celotex Corp., pf.	20⅞	20¼	20⅝
Certain-Teed Products Corp.	18½	16½	18⅜
Certain-Teed Products Corp., pf.	....	....	....
Champion Paper & Fibre Co.	47¼	43	46¾
Champion Paper & Fibre Co., pf.	107	107	107
Congoleum Nairn Co.	28¾	26¼	28¼
Container Corp. of America	41½	38¼	41½
Continental-Diamond Fibre Co.	10½	9½	10⅛
Crown-Zellerbach Co.	29¾	27⅛	28¾
Crown-Zellerbach Co., pf.	105½	104	105½
Dixie Cup Co.	36	30¼	34½
Dixie Cup Co.—A	53½	51	53½
Flintkote Co.	32½	29⅜	31⅜
Flintkote Co., pf.	108	105	108
Robert Gair	8	7¼	7⅜
Robert Gair, pf.	19	18⅝	18⅞
International Paper Co.	43	38⅝	42¾
International Paper Co., pf.	98⅞	97¼	98½
Johns-Manville Corp.	130	121	130
Johns-Manville Corp., pf.	120	118	120
Kimberly-Clark Corp.	27	25½	25½
MacAndrews & Forbes	33¾	33¾	33¾
Mac Andrews & Forbes, pf.	....	....	....
Masonite Corp.	57	51	56¾
Mead Corp.	21⅜	18½	21
Mead Corp., pf. 4¼	105½	105	105
Mead Corp., pf. 2	48	45½	46¾
National Container Corp.	28⅞	26	27½
Paraffine Companies, Inc.	66	56	66
Paraffine Companies, Inc., pf.	109	109	109
Rayonier, Inc.	20½	17⅜	19⅜
Rayonier, Inc., pf.	35½	33¾	33⅞
Ruberoid Co.	45½	43	44½
Scott Paper Co.	46½	44⅞	46½
Scott Paper Co., pf.	103	103	103
Sutherland Paper Co.	43½	40½	43
Union Bag & Paper Corp.	29¾	25⅜	29¾
United Paperboard Co.	9⅞	9⅜	9½
U. S. Gypsum Co.	112	103	112
U. S. Gypsum Co., pf.	199	199	199
West Virginia Pulp & Paper Co.	42½	39½	41
West Virginia Pulp & Paper Co., pf.	114	111¾	114

BONDS

Abitibi Pulp & Paper Co. 5s '53	....	....	....
Celotex Corp. 3½s '60	103¾	103¾	103¾
Certain-Teed Products Corp. 5½s '53	....	....	....
Champion Paper & Fibre Co. 3s '65	....	....	....
International Paper Co. 5s '47	100¼	100⅛	100⅛
Mead Corp. 3s '66	104	104	104

New York Curb Exchange

High, Low and Last for Week Ending September 28, 1946

STOCKS

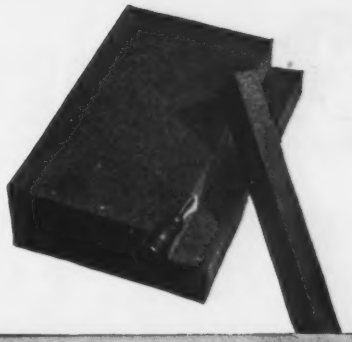
	High	Low	Last
Great Northern Paper Co.	40	37	39½
Hummel-Ross Fibre Corp.	14¼	12¾	14⅛
St. Regis Paper Co.	10⅛	9⅛	9¾
Taggart Corp.	8	6⅞	8

BONDS

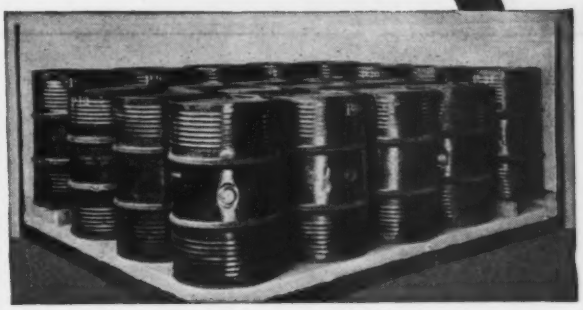
American Writing Paper Co. 6s '61	....	....	....

The Versatile Insulation

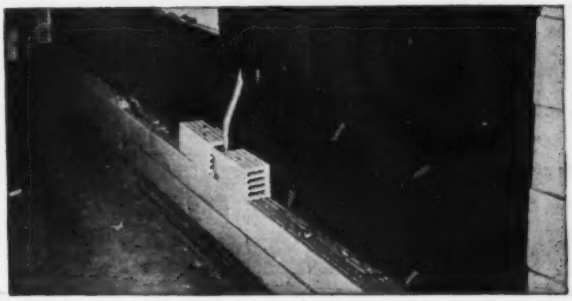
PC FOAMGLAS...



EASILY HANDLED—Light, rigid, strong, the big pieces of PC Foamglas are conveniently packaged, easily handled. They can be cut to fit around openings and obstructions right on the job. When you install PC Foamglas the first cost is the last cost.



STANDS THE LOAD—Under concrete wearing floors, PC Foamglas withstands pressure much greater than normal floor loads. It has proved able to maintain desired temperature levels over cold ramps and open loading platforms, to prevent heat travel from rooms below.



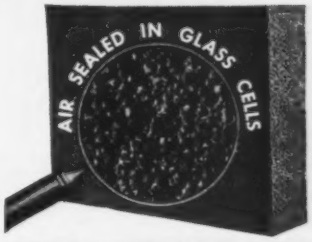
STAYS IN PLACE—In core walls, PC Foamglas becomes an integral part of the structure, can be tied in to brick, tile or other backing and facing. This rigid, cellular glass material does not pack down, slip, warp, or rot—it is damp-proof, verminproof, incombustible.

INSULATES PERMANENTLY—A firm, level base for roofing felt. PC Foamglas is so easily installed it speeds up the job. It insulates efficiently, protects roof slabs. Even a break in roofing felt entails no expensive repairs or replacement of PC Foamglas.

ON roofs, in floors and core walls, PC Foamglas has proved its efficiency in all sorts of plants where temperature levels must be maintained and condensation minimized.

Made of air-filled glass cells, PC Foamglas does not warp, check, swell, shrink or rot. It is impervious to moisture, vapor fumes and most acid atmospheres, elements that cause other materials to lose insulating efficiency. Freedom from repairs and maintenance makes its use a positive economy. Owners of all sorts of plants all over the country can tell you that PC Foamglas has licked many a tough insulating job—permanently.

Our specialists will be glad to consult with you on any problem that involves insulation. Also you will find a wealth of helpful information in the booklets we offer. Check the convenient coupon, mail it in today and your selection of literature will be sent to you promptly. Pittsburgh Corning Corporation, 632 Duquesne Way, Pittsburgh 22, Pa.



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Please send along my *free* copies of the booklets I have checked. It is understood that I incur no obligation.

Roofs_____ Walls_____ Floors_____

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PC FOAMGLAS *Waterproof Fireproof* **INSULATION**

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13 Cords an Hour

A-C TOUR SHOWS OTHER MILLS DE-BARKING 6 to 10 CORDS PER HOUR . . . GAINING IN WOODROOM OPERATION AND PULP QUALITY

AT 30° BELOW ZERO OUTSIDE TEMPERATURE, in this leading Eastern Mill, Streambarker averaged 10 cords per hour on frozen Spruce! As temperature rose to 20° above, capacity jumped to 15 cords!

Mill officials figure Streambarker averages close to 13 cords per hour year 'round, "does the job faster . . . gets logs out cleaner and with fewer rejects than by conventional barking methods"!

Mill after mill can tell you about valuable savings — in stepped-up production, lower wood loss, better quality pulp — they're getting through Streambarker hydraulic log barking.

To figure accurately savings your mill can make, call your nearby A-C office, or write for "Streambarker Economics" bulletin B6391. ALLIS-CHALMERS, MILWAUKEE. A 2042

LOGS COME INTO Streambarker from pre-washing drum in which river water is used to remove ice and raise log temperature several degrees.

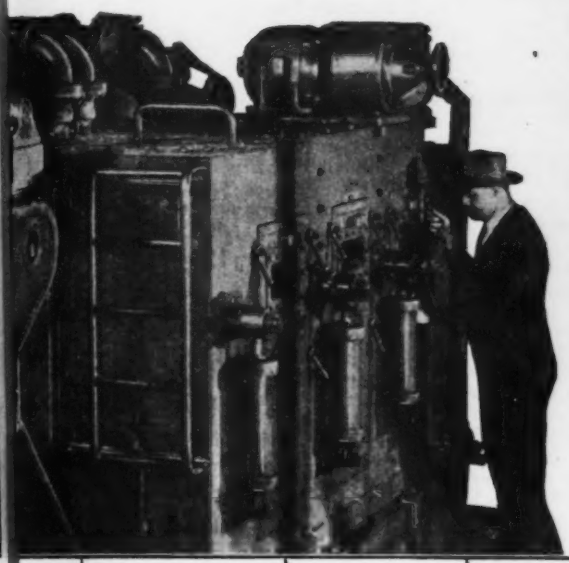
CHECK ACTUAL FIGURES REPORTED BY 12 DIFFERENT MILLS!

MILLS	Species of Wood Barked	Size of Logs Barked	
MILL A	Spruce, Fir and Hemlock	4 to 18" diam., 4 ft. long	
MILL B	Spruce, Fir and Poplar	4 to 18" diam., 4 ft. long	
MILL C	Spruce and Hardwood	4 to 20" diam., 4 ft. long	
MILL D	Spruce	4 to 18" diam., 4 ft. long	
MILL E	Balsam, Hemlock, Spruce, etc.	4 to 20" diam., 4 ft. long	
MILL F	Spruce and Fir	3 to 18" diam., 4 ft. long	
MILL G	Spruce and Fir	3 to 18" diam., 4 ft. long	
MILL H	Birch, Maple, Beech	4 to 18" diam., 4 ft. long	
MILL I	Poplar and Spruce	4 to 20" diam., 4 ft. long	
MILL J	Spruce, Fir, Pine, Hemlock	4 to 20" diam., 4 ft. long	
MILL K	Pine, Birch, Poplar, etc.	3 to 20" diam., 4 ft. long	
MILL L	Spruce	3 to 20" diam., 8 ft. long	

ALLIS A-C CHALMERS

One of the Big 3 in Electric Power Equipment— Biggest of All in Range of Industrial Products

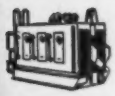
WITH STREAMBARKER!



LOG GOES IN, is engaged by 2 bed rolls which revolve it under 3 high-pressure, bark-removing water jets.

LOG COMES OUT — bark *clean*, with *no* brooming of ends, with *no* dirt, and *no* surface rot!

Streambarker Schedule		Water Pressure		No. of Men, Convey., Barker, Inspec.	Capacity Cords per Hour		Process in which Streambarked Wood is Used	Method of Bark Disposal	Miscellaneous Notes and Mill Comments
Hours per Day	Days per Week	Summer	Winter		Summer	Winter			
16 to 24	6 to 6½	750 lbs.	750 lbs.	4	9	6	50% Sulphite 50% Groundwood	100% to Boiler	Installing hot pond for winter barking. Expect to improve operation.
9	6	670 lbs.	670 lbs.	3	10	8	100% Groundwood	100% to Boiler	"All steam generated by wood waste and bark," say Mill Officials.
24—auxiliary to drums	6 to 6½	650 lbs.	650 lbs.	4			Bleached Sulphite	Bark to Dump	Streambarker used on wood which other barking equipment cannot handle.
9 to 12	6	730 lbs.	730 lbs.	4	13	8½	88% Sulphite 12% Groundwood	100% to Boiler	"Pulp quality raised materially," say Mill Officials.
16	6	670 lbs.	770 lbs.	3 to 4	9½		60% Sulphite 40% Groundwood	Bark to Incinerator	Booster pump for winter barking has recently been installed.
Auxiliary to drums	6	750 lbs.	750 lbs.	3			Groundwood, Unbleached Sulphite	100% to Boiler	Streambarker barks wood which other barkers cannot efficiently handle.
24	6⅔	780 lbs.	780 lbs.	4	9	7	100% Sulphite	100% to Boiler	Streambarker is first full-scale barker this mill has installed.
17	6½	635 lbs.	635 lbs.	7 incl. unload, loading	9	7½	100% Soda	Bark to Dump	One of 1st Streambarker installations—yet low maintenance right along.
16	6⅔	750 lbs.	750 lbs.	4	10	7	100% Sulphite	100% to Boiler	"We've eliminated knot boring, hand-cleaning, etc.," state Officials.
24	7	650 lbs.	750 lbs.	3	9½	6½	50% Sulphite 50% Groundwood	⅔ to Boiler, ⅓ to Dump	Streambarker cleans logs that cannot be cleaned by other barkers.
8	6	675 lbs.	675 lbs.	5	10	6½	100% Soda	100% to Incinerator	"Barker operation and capacity both very good," say Mill Officials.
16	6	675 lbs.	675 lbs.	4	10	9½	50% Sulphite 50% Groundwood	100% to Boiler	Booster pump being installed to raise pressure to 775 pounds.



PREPARATION—Hydraulic Barkers, Chip Screens, Saws, Slashers, Grinders.

COOKING—Digesters, Blow Tanks, Kilns, Heat Exchangers, Condensers.

WET ROOM — Vibrating Screens for use as Thickeners, dewatering rejects, etc.

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Britain Takes Steps to Assure Larger Supply of Newsprint

MONTREAL — Great Britain will import about 150,000 long tons of Canadian and Newfoundland newsprint next year, with the hope of increasing that amount to from 300,000 to 350,000 tons each year, according to statements here by Sir Walter Layton, chairman of the rationing committee of the British Newsprint Supply Company. Sir Walter came to Canada to conclude newsprint contracts for British newspapers for the next five years and his announcement followed conferences with company officials here and in Quebec and Ottawa. He indicated that he did not get assurance of all supplies sought but that "we are getting within shooting distance of the target."

Concurrently there were indications that hopes for success of efforts by Canadian newsprint producers for higher prices were again rising. Sir Eric Vansittart Bowater — of the Bowater organization which is reputed to be responsible for the distribution of over 65 per cent of the newsprint used in Great Britain — also in Canada to confer with pulp and paper interests — made the prediction of an advance to $85 per ton. While warning against efforts to push 'print prices too high, Sir Eric mentioned the need for a price increase in order that the industry should be able to cope with added production costs, in order to maintain stable supplies.

In the industry it is believed that there is an element among U. S. publishers which entertains views similar to those of the British authority. Such views take into consideration world markets and conditions of supply and demand which appear certain to persist for some time to come. It has been known that in recent months there have been pressing demands on Canadian mills for supplies for export to Empire and foreign countries at most any prices the manufacturers cared to ask. Opinion in the industry here is that Canada holds the key to the American situation because many mills in the United States had been converted to the manufacture of more profitable paper products, while, for the present at least, the prospect of substantial relief through importations from Scandinavia is far from bright.

Bowater — president of Bowater's Newfoundland Pulp and Paper Mills Limited, with capacity of 210,000 tons of newsprint and 30,000 tons exportable sulphite—urges increase in newsprint prices to meet increasing costs largely the result of higher wages which must be paid from the time the logs are cut until the finished product is in the hands of the publisher; and, as in other manufacturing processes, costs of materials, too, are rising. On the point as to whether rising prices, which might result in the curtailment of consumption by say 10 per cent, would have the effect of shifting the outlook of the industry from a sellers' to a buyers' market Sir Eric saw no prospect of such a change until there was a more substantial increase in volume of production or curtailment of consumption—now far short of being satisfied.

Instancing the ease with which Consolidated Paper — subsidiaries include Belgo, Laurentide, Port Alfred, St. Maurice Valley and Wayagamack mills —had carried out a refinancing operation recently, Sir Eric takes the view that this reflects the confidence generally shown in the solid position of the industry. And he expressed confidence that this condition should last for at least five years. He argues that the newsprint people have made their position sound by constructive planning, with the result that the situation could not be regarded as comparable with that which prevailed a similar period after the first World War. He recalled that after 1918 there was a sudden growth of pulp and paper plants with the result that production capacity exceeded demand to the extent that paper was sold for very little more than the cost price. Profits in that period were lean or negligible; this meant that valuable timber resources were being consumed without direct or indirect return to the citizens of those countries, who had been led to regard such resources as a basis of substantial contribution to the national income, and a source of revenue against rising governmental costs and attendant taxation.

Reverting to the hopes of British publishers of getting closer to what they regard as an adequate, or even minimum, supply, it may be pointed out that daily British newspapers now have a five-page daily average and the arrangements just effected by Sir Walter Layton are aimed at a rising scale looking to an average of 12 pages in 1950—six pages in 1947, eight in 1948, and ten in 1949. Before the war the total newsprint consumption in Britain — imports from all sources — was approximately 1,250,000 tons annually. This was reduced to about 250,000 tons which it was now expected to raise to 300,000 tons with the increase in imports from America.

By reduction in number and size of pages and employing a lighter-weight sheet, British publishers have been able to supply 25 million daily readers as compared with a low of 19 million during the war years. With increased supplies now in sight, Sir Walter predicted an immediate increase in circulation of 10 to 12½ per cent. Such circulation of daily papers of the size and weight prevailing before the war would require about 2,000,000 tons annually, he said. And he pointed to Britain's international responsibility in the dissemination of news from the democratic nations of social and political developments in relation to the world economic scene.

Scott Contracts for Canadian Pulp

CHESTER, Pa. — Scott Paper Co. has completed plans for a new source of pulp from a Canadian mill. Recently, a long-term contract was entered into for the delivery after January 1, 1947, of the entire output of this mill with an annual capacity of approximately 20,000 tons.

The Company instituted in 1937 a program which was intended to assure an adequate source of pulp. In that year the pulp plant at Brunswick, Georgia, owned in conjunction with the Mead Corporation, was completed. In subsequent years, the company's wholly owned subsidiaries acquired pulp producing facilities at Empire, Oregon; Anacortes, Washington; Clermont, Canada; Marinette, Wisconsin; and Menominee, Michigan.

Egan Offers Paper Industry Advisory Consulting Service

BOUND BROOK, N. J. — Frank W. Egan has started an advisory and consulting service for the paper converting industry. He was formally with the John Waldron Corporation and the J. O. Ross Engineering Corporation for a period of twenty years.

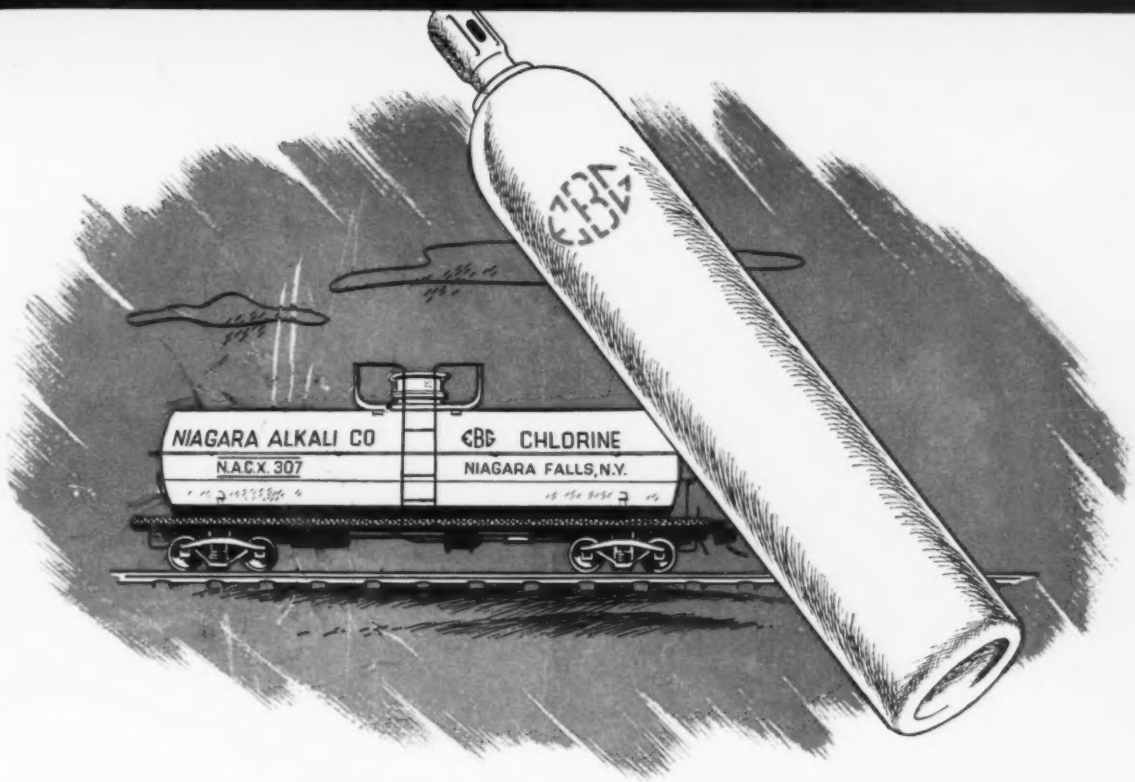
The advisory and consulting service will include coating on paper making machines, coating in general such as clay, lacquer, varnish, wax, gum and the new silicone resin, laminating and the treatment of paper with phenolic, urea and melamine resins, printing, embossing and hot melt coating.

Mr. Egan has been a member of TAPPI since 1928 and is chairman of the Coating Mechanical Equipment Subcommittee. He is located at 615 Church St., Bound Brook, N. J.

Dexter Pay Rate Boosted By Nine Cents More

DEXTER, N.Y.—A nine-cent an hour age boost, retroactive to July 7th, has been granted to all hourly-paid employes of Dexter Sulphite Pulp and Paper Company, company officials announced. The two unions, Local 121, International Brotherhood of Pulp Sulphite and Papermakers, and Local 64, International Brotherhood of Papermakers, had asked for an increase of 12½ cents per hour but agreed to a compromise of nine cents.

The raise brings the minimum hourly wage for labor to 83 cents. A total of 18 cents an hour has been granted in raises to employes since V-J Day. The latest raise will affect approximately 200 employes.



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Aries Urges A. S. M. E. Study Wood Waste

BOSTON—A comprehensive program for the better utilization of wood and wood waste to be carried out by the lumberjack, forester, engineer and executive for the benefit of all, was advocated this week by Robert S. Aries, director of the Northeastern Wood Utilization Council, who addressed the wood industries session of the Fall meeting of the American Society of Mechanical Engineers at the Hotel Statler.

"It is a painful fact that more than two-thirds of the forest drain is lost during manufacture and use," Mr. Aries said. "About a ton of wood per thousand board feet of lumber is left at the sawmill as sawdust, slabs and edgings, while three tons are left in the woods as tops, limbs, broken and cull logs, cull trees and non-commercial species. It may be estimated that there are about 100 million tons per year of wood which are not utilized.

"The wood industry is a field worthy of more attention by engineers not only from the point of view of conservation but also because it should offer attractive possibilities for achievement and success," he continued. "The encroachment of other materials on fields of wood use is nothing more than the normal response of technology for the demand for new and better products at reasonable costs. Now is the time to introduce adequate manufacturing techniques, utilize wastes and develop new products. The pent-up demand for the products of the wood industry should not lull it into inactivity, as keen competition from steel, light metals, concrete and plastics is again bound to come.

Marathon Employes Win Wage Boost Contract

MENASHA, Wis. — About 2,500 employes of Marathon Corporation will receive hourly wage increases, effective September 2, under a contract which has been ratified by AFL locals of the International Brotherhood of Papermakers and the International Brotherhood of Pulp, Sulphite and Paper Mill Workers, it was announced September 25 by Emil Noren, regional director of the Papermakers.

Marathon employes at the Menasha, Ashland and Rothschild divisions and the two divisions at Wausau are affected. Male employes working eight hours daily received an increase of seven cents per hour, making their base pay 92 cents per hour, or a total increase of 22 cents hourly since V-J Day. Women on the 40-hour week basis received increases of three cents hourly, bringing their base pay to 80 cents per hour, a total increase of 18 cents since V-J Day.

Employes working six hours a day received increases of ten cents an hour, bringing their base pay to $1.01 an hour, a total increase of 25 cents hourly since V-J Day, Mr. Noren said. The three-cent differential was granted to equalize the "take-home" pay of men working 36 hours compared to those working 40 hours, a corporation spokesman stated.

Marathon Names Rawson To Succeed George Holt

MENASHA, Wis.—Roy J. Sund, vice president in charge of manufacturing for Marathon Corporation at Menasha, made known September 26 the appointment of Don C. Rawson, Neenah, as resident manager of the corporation's plant at Menominee, Mich. Mr. Rawson succeeds George W. Holt, who has resigned to become president and general manager of the Accepted Products Company at San Francisco, Calif., a paper specialty manufacturing concern.

The appointment of Mr. Rawson was effective immediately. He originally became associated with Marathon in 1933. Since then he has held numerous manufacturing supervisory positions in the maintenance and production departments.

Lake States TAPPI Will Hear Of Technical Department Function

APPLETON, Wis. — The Lake States section of the Technical Association of the Pulp and Paper Industry will meet after a 6:30 dinner Wednesday, October 9, at the American Legion clubhouse, according to A. M. Heald, Menasha, Wis., secretary. A panel discussion, led by John Strange, secretary of the Institute of Paper Chemistry, on "Trends in the Organization and Functions of Technical Departments," will be held.

Speakers will be John Catlin of Kimberly-Clark Corporation, "The Organization of a Technical Department in a Larger Mill"; H. P. Dixson, of the Fox River Paper Corporation, "The Organization of a Technical Department in a Smaller Mill"; W. H. Graebner, of Marathon Corporation, "The Relationship of the Technical Department to Management"; G. K. Dickerman, of Consolidated Water Power and Paper Company, "The Relationship of the Technical Department to production"; M. L. Downs, of Thilmany Pulp and Paper Company, "The Relationship of the Technical Department to the Sales Department."

Kimberly Mill Votes On Bargaining Agent

KIMBERLY, Wis. — Workers at the Kimberly mill of Kimberly-Clark Corporation will participate Friday, October 4, in an election conducted by the Wisconsin Employment Relations Board to determine whether the independent Kimberly Miil Workers union of the United Mine Workers, District 50, AFL, will be the bargaining agent for the Kimberly mill employes.

Paper Men Unite In Tree Program Study

WAUSAU, Wis.—Problems involving wood supplies and forestry matters pertaining to the welfare of the pulp and paper manufacturers and the lumber producers of the Great Lakes states were discussed here September 24 by members of the Forest Industries Information committees of Wisconsin, Michigan and Minnesota.

Folke Becker, president of the Rhinelander Paper Company, Rhinelander, Wis., and of Trees for Tomorrow, Inc., and chairman of the Wisconsin Forest Industries Information Committee, president at the joint session, held at the Wausau Club.

Minnesota's comprehensive program of education directed toward arousing public appreciation of forest products was outlined by L. A. Furlong, Minneapolis, chairman of the committee from that state.

Prof. W. F. Ramsdell of the University of Michigan presented an ambitious plan for better utilization of idle forest lands to meet the needs of the $218,000,000 paper industry.

(By coincidence, a third state forest for Michigan's Upper Peninsula was dedicated at Menominee, Mich., the day before the meeting by the Michigan State Conservation Department. Fifty thousand acres of state-owned lands in the southeastern part of Baraga county were set aside to create the Baraga State Forest).

Earl W. Tinker, New York City, secretary of the American Pulp and Paper Association, said that there are millions of acres of land in the Lake States which could, under systematic management, produce the large volume of timber so urgently needed by the pulp and lumber mills.

Adequate representation at the National Forest Congress in October at Washington, D. C., was urged by Rex Black, St. Paul, Minn., vice president of the Weyerhauser Sales Company.

D. C. Everest, president and general manager of Marathon Corporation, was host to the group of about 25 at a luncheon at the Wausau Club. A 20-pound muskellunge was served.

Twin Cities Safety Council Opens Season's Meetings

NEENAH, Wis.—The executive committee of the Twin City Safety Council, with Fred Bentzen as this year's chairman, has announced that the opening meeting will be held October 18. Two committees have been named. H. H. Aderhold, of Marathon Corporation, is chairman of the program committee for 1946-47 and will be assisted by Clarence Elmgren, of Gilbert Paper Co., and Don Severson, of Neenah Paper Company.

Herman J. Goffin, Bergstrom Paper Company, has been appointed publicity chairman, and will be assisted by Henry Werner and Leo Boehm.

Holyoke Hears Its Dike Is Deferred

HOLYOKE, Mass.—Holyoke's $2 million flood control project on the Springdale dike, designed to protect Holyoke's paper industry, which was interrupted by the outbreak of the war, has received another indefinite delay through the drastic curtailment of all New England flood control and harbor dredging projects.

According to word from Maj.-Gen. D. L. Weart, director of the New England office of the army corps of engineers, the new slash will bring to an abrupt halt projects totaling $25,000,000. The move has been as part of federal administration economy drive, Gen. Weart stated.

The Holyoke job comprised the reinforcing of the Springdale dike and extending it for a quarter of a mile. The work had been carried on for about four years before the war, and then came to a sudden halt during the years of conflict.

Holyoke officials were not greatly concerned over the work stoppage today, for the area in question is believed to be "in pretty good shape," in the words of one official in this city.

Hearing Speakers Back Navigation to Holyoke

SPRINGFIELD, Mass. — Paper manufacturers whose mills line the Connecticut River here and in Holyoke this week received great encouragement in a century-long battle to make the river navigable from Hartford to Holyoke. At hearings held late last week in Springfield's Municipal Auditorium, state, city and Federal officeholders, manufacturers, yachting interests, public organizations and private individuals went on record as favoring extension of river navigation to Holyoke, citing the benefits that would be derived from a commercial channel. No one spoke in opposition.

Federal newspapermen who had covered countless such sessions said they were surprised at the refreshing views aired at the hearing, and said they expected favorable action in the next two or three years.

Sorg Builds Pulpwood Storage

PORT MELLON, B. C. — Sorg Pulp Company is busily engaged on construction of yard storage for pulpwood, on a reclaimed area near the mill. The yard storage will have a capacity of 10,000 cords on completion. The yard is distinctly different to that of any other plant on the Pacific coast, due to the fact that the Sorg Pulp Company is consuming a large quantity of jack pine in cord lengths. As a result a conveyor and stacker are being built in the yard, and the stock pile bears much more resemblance to that surrounding an eastern pulp mill than it does to any other on the coast.

OBITUARY

Frank M. Williams

WATERTOWN, N. Y.—Frank M. Williams, 72, president of the Williams Apparatus Company, Inc., the Williams Size and Service Corporation, and former professor at Clarkson and Williams Colleges, died suddenly on Friday, September 20, at the home of his nephew. Mr. Williams founded the Williams Apparatus and Williams Size and Service firms here. For one year, from 1897 to 1898, he was associate professor in chemistry at Williams College serving with the professor who taught him. In the fall of 1898, Mr. Williams was named professor of chemistry at Clarkson College of Technology, remaining there for eleven years.

In 1909, Mr. Williams left Clarkson and came to Watertown to open a laboratory as a consulting chemical engineer. Mr. Williams invented and developed many testing instruments for use in the paper industry. Among his inventions and developments are the freeness testing unit for use in ground wood pulp mills; ovens for detection of moisture in pulp and paper; an ink penetration tester and tester for smoothness of paper; instrument for forming of handmade sheets of paper; a hydraulic press for both paper and plastic industry; modification of the old type Orsat gas analysis apparatus for analyzing flue gas and a suction gas dresser.

Frank Williams was one of the oldest members of the American Paper and Pulp Association. He was one of the leaders in formation of the Empire section of TAPPI. He was a member of the First Presbyterian church, the fraternal order of Elks and Masonic bodies, including Media Temple.

The business which he founded is to be continued by his son, Maj. Dexter Williams, now on terminal leave at Watertown.

Charles W. Seiberling

AKRON, Ohio — Charles W. Seiberling, 85, died September 20 of a heart ailment in Akron City Hospital. He had been president of the Thos. Phillips Company of Akron, manufacturer of sacks and bags, since 1935; and was recognized as one of the pioneer rubber industrialists of the country. With his brother he founded the Goodyear Tire and Rubber Company and the Seiberling Rubber Company. He was vice-president of the latter company at the time of his death. He was actively interested in the many charitable and civic organizations in Akron, and "C.W.", as he was known to all, was named Akron's first citizen many years ago.

Ralph B. McKinney

WILMINGTON—Ralph B. McKinney, 58, general manager of the Paper Makers Chemical Department and member of the board of directors of Hercules Powder Company, died September 21 at the Delaware Hospital after two weeks' illness. A native of Wilmington, Mr. McKinney had been associated with Hercules since its organization in 1913 when he became a member of the company's purchasing unit. In 1922, he was made manager of the purchasing department.

Mr. McKinney was appointed assistant to the general manager of the explosives department in 1929. Three years later, he again was named director of purchases.

In 1937, he transferred to the paper makers chemical department, and in 1942 was made assistant general manager. One year later, he advanced to general manager of the department.

Mr. McKinney was elected a member of the board of directors in January, 1945.

W. B. Narvesen

NEW YORK — W. B. Narvesen, vice-president of the Seaman Paper Company, passed away on Thursday, September 26, after a short illness. Mr. Narvesen was connected with the Seaman Paper Company for the past thirty years. He is survived by his widow, Mrs. Lorle. Mr. Narvesen's affiliations included membership in Philadelphia Paper Cordage Association, Sales Association of the Paper Industry in New York, Paper Club of New York, Polar Star Lodge, F. and A. M.

Edward O. Babcock

NIAGARA FALLS, N. Y. — A retired paper manufacturer, Edward O. Babcock, 85, died Sept. 24 in Memorial Hospital after a short illness. He formerly was head of the Davy Pulp & Paper Company of Thorold, Ont., retiring about twenty years ago. Mr. Babcock was born in Mayville and came to this city in 1884. Soon after he joined the Davy Pulp & Paper Company. He is survived by a son, Howard O. Babcock, of Buffalo.

John Gilman Clark

HOLYOKE, Mass. — John Gilman Clark, 60, New England representative of the McLaurin-Jones Company of Brookfield, makers of gummed, coated and laminated papers, died Tuesday of last week in Holyoke Hospital after a short illness.

Clark was widely known in the paper industry, having joined the sales force of the Hampden Glazed Paper and Card Company as a young man. For many years he also headed that company's cost department. In 1925 he joined McLaurin-Jones as New England representative, the position he held at his death.

Herman P. Janssen

COMBINED LOCKS, Wis.—Herman P. Janssen, Sr., 72, treasurer of the Pulp and Sulphite Workers, Local 144, and for 54 years an employe of the Combined Locks Paper Company, died September 18, after an illness of 3 months. He was prominent in many civic affairs.

Planned maintenance and careful attention to lubrication have paid big dividends to this mill over a period of many years. The Gulf Lubrication Engineer in the picture (left) is consulting with the Foreman on paper machine lubrication.

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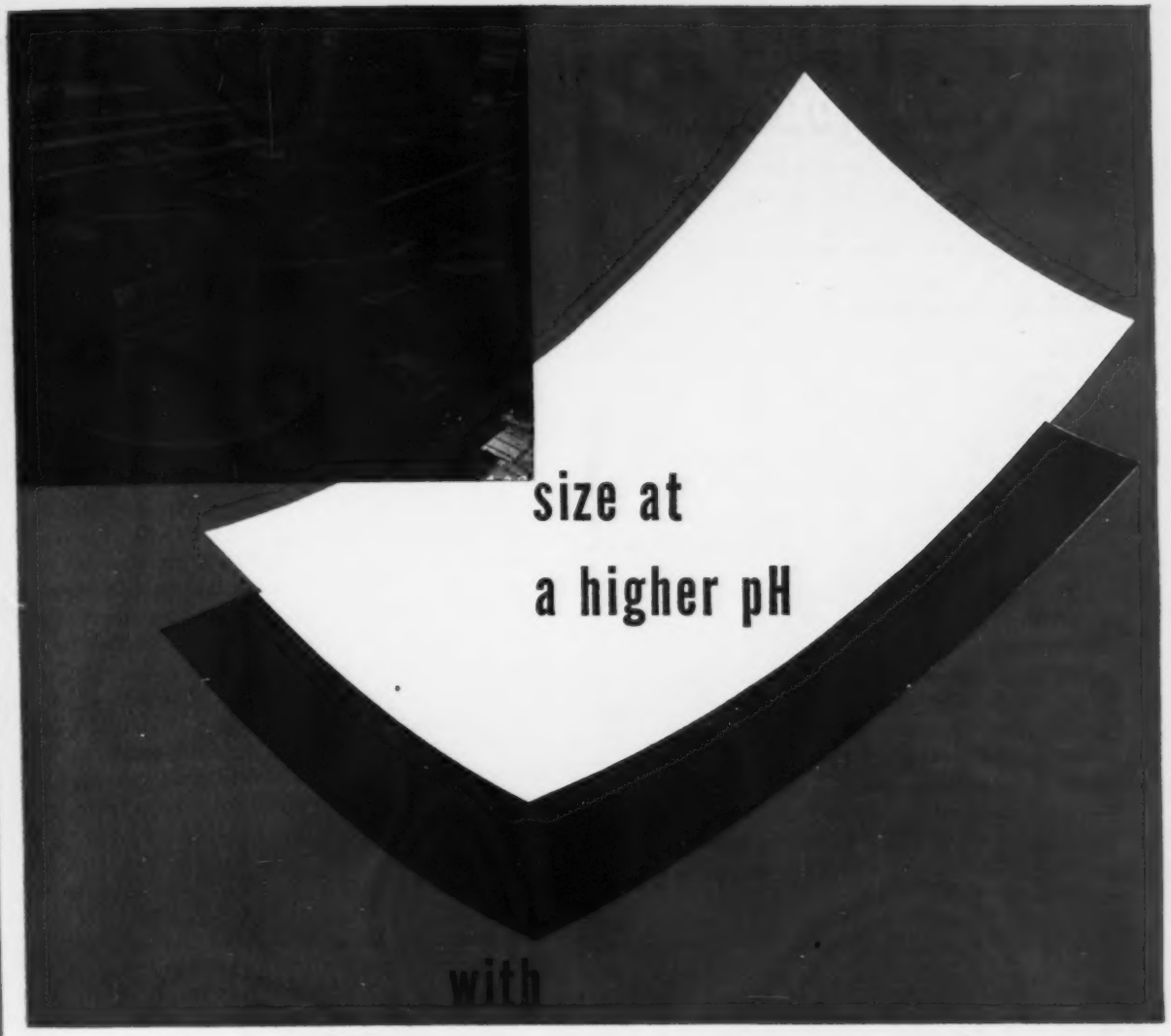

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PAPER TRADE JOURNAL

Title Reg. U. S. Pat. Off.

W. L. Cook, Editor

A Visitor From Boston

A gentleman from Boston dropped in at our desk the other day to watch us and help us at our work, he said. His idea of help, it developed without any further delay, was to ask us why, in the name of Paul Bunyan, the Government finds it so easy to swing a big club at the paper industry, and to blame the paper industry for not solving a problem which lies partly within the hands of Government itself to correct.

"How much further do these fellows intend to go before they stop?" he asked. "Or are they just waiting for us to stop them?

"All this talk about the Government threatening to go into the pulp and paper manufacturing business because they can't get all they want is worse than nonsense," he went on. "The next thing will be to show that the Government needs the railroads to transport its personnel, so they had better take over the roads. And on and on like this until they have the mines, the factories, and a totalitarian state. Let's make up our minds to stop it now.

"The way for the Government to have enough paper is for the departments to use it frugally. If the bureaucrats want a planned economy here's one way they can show us how their planning will work out right in their own bailiwick. Perhaps then they may sell us the idea that their planning has a grain of value to it."

He reached across our desk and took from a corner a forty-page bulletin which had come in that morning. "I'll bet you got at least two of these," he declared. He was right. The pamphlet he picked up weighed more than two ounces, and we gave him our duplicate copy.

"Why I know is because of what I got in the mail this morning just as I left the office. Here is a bunch of paper weighing about two and a half ounces that I never asked for. I'm a paper dealer and they're offering to sell me glass bottles and wooden cases and metal cans. I have never asked to be put on any list, and I don't know how they got my name for this type of stuff that I don't handle so they could invite me to come out to Kansas City to bid on it.

"Mr. Giegengack's 'proof' of why the Government needs more paper than during the war sounds like just so much nonsense. God knows we probably will have income tax blanks for a long time to come, more's the pity, but the other items enumerated seem to me as non-recurring. Everyone in business knows the terrible waste of paper used in mailing stuff from this and that Bureau in duplicate, triplicate or more, that just becomes office waste. The only thing it's good for is to be converted into boxboard."

It would be unfair, probably, to single out any one office of Government as an example of wasteful use of paper. Mr. Giegengack, as Public Printer, is charged with securing the paper that is required to meet the demands of other branches of the Government. He has found this task increasingly difficult and has dramatized it by showing that the Government may have to go into the paper manufacturing business to get as much paper stock as it needs.

This theme was picked up later and expanded upon, to the tune of seven mimeographed pages by his Congressional superior, the chairman of the Joint Committee of Congress in charge of paper procurement. It was not the Public Printer's official concern to question the print orders that he receives, nor did it occur to the Senator to doubt that the Government has pared its requirements to the basic need. That would involve discourtesy to another committee or to another Department of the Government. And yet, since they also are taxpayers, and employers of labor which also pays taxes so long as it is gainfully employed, the men who make and sell paper have a right to question, as citizens, the good taste of any branch of Government that threatens to add more expense to the budget just to be able to continue other practices which could wisely be examined and adjusted to actual need.

That our visitor from Boston had received nearly three ounces of paper in which he was not the least bit interested and for which he had in no way asked, is a small matter. So, it may be admitted, is the duplication of bulletins which is a familiar experience of most industrial organizations. On the basis of such experiences, however, there are some who could question whether or not the official estimate of 41 million pounds of paper needed for the fourth quarter of the present year could not be pared down to about 20 million pounds, or less. Perhaps the Government, in addition to a Public Printer, needs a Public Editor—one with experience in getting all the facts into the smallest possible space and yet keep it attractively legible—one who learned the finer edges of sharp cutting while he was getting out a reduced size paper during the war, or during the past few months of his inability to get paper for his own uses.

Calendar of Coming Events

October 14-16, 1946—TAPPI Alkaline Pulping Meeting, Roosevelt Hotel, New Orleans, La.

October 17-19, 1946—National Paper Trade Association, Fall Convention, Edgewater Beach Hotel, Chicago, Ill.

TAPPI Notes

The TAPPI Western New York Group of the Empire State Section will meet at the Prospect House, Niagara Falls, N. Y., Wednesday, October 9th at 6:30 p.m. J. A. Van den Akker of the Institute of Paper Chemistry, Appleton, Wis., will talk on "Instrumentation in the Paper Industry." This meeting is designated as Managers Night and will be held jointly with the Niagara Chapter of the Canadian Pulp and Paper Association Technical Section.

The TAPPI Maine-New Hampshire Section will meet at the Eastland Hotel, Portland, Maine, on November 8-9, 1946.

The TAPPI New England Section will meet at the Roger Smith Hotel, Holyoke, Mass., Oct. 18th.

The TAPPI Delaware Valley Section will meet at the Hercules Powder Company Experiment Station, Wilmington, Delaware, on October 11th. Mr. Sheen of W. H. & L. D. Betz will discuss "Water."

Ingmar Jaatinen, formerly of Wartsila-Cellulosa A/B, is now engineer for A. Ahlstrom O/y, Norrmark, Finland.

Frederick W. Hooper is now Vice President of the Ross Engineering Company of Canada, Ltd., Montreal, P. Q.

Harold R. Dalton, formerly of the Paper Manufacturers Company, is now consulting chemist, Rydal Road, Jenkintown, Pa.

Gustav Soderlund, technical director and Sten Lindberg of Holmens Bruks och Fabriks A/B, Norrkoping, Sweden, are visiting in the United States and Canada.

D. K. MacBain of the B-F-D Company, has been transferred from New York to 61 So. Lexington Ave., White Plains, N. Y.

Raymond T. De Pan, paper engineer of the Flintkote Company, has been transferred from E. Rutherford, N. J., to Mt. Carmel, Ill.

Production Ratio Report*

(Production as per cent of six-day capacity)

COMPARATIVE WEEKLY SUMMARIES

Current Weeks—1946		Corresponding Weeks—1945	
August 17	104.5	August 18	67.8
August 24	106.1	August 25	95.4
August 31	105.6	September 1	95.2
September 7	86.7	September 8	75.9
September 14	105.1	Ceptember 15	94.0
September 21	*105.8*	September 22	94.3

COMPARATIVE MONTHLY SUMMARIES

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year Avg.
1945	86.7	89.4	90.2	88.1	89.8	91.2	80.8	83.6	90.2	95.9	95.5	91.0	89.7
1946	94.7	98.4	104.4	102.7	100.7	104.6	94.0	*104.7*					

COMPARATIVE YEARLY SUMMARIES

	1939	1940	1941	1942	1943	1944	1945	1946
Year to Date	79.5	86.2	95.0	92.2	88.1	87.8	88.0	*100.0*
Year Average	83.4	85.6	97.4	90.4	87.8	88.1	89.7	

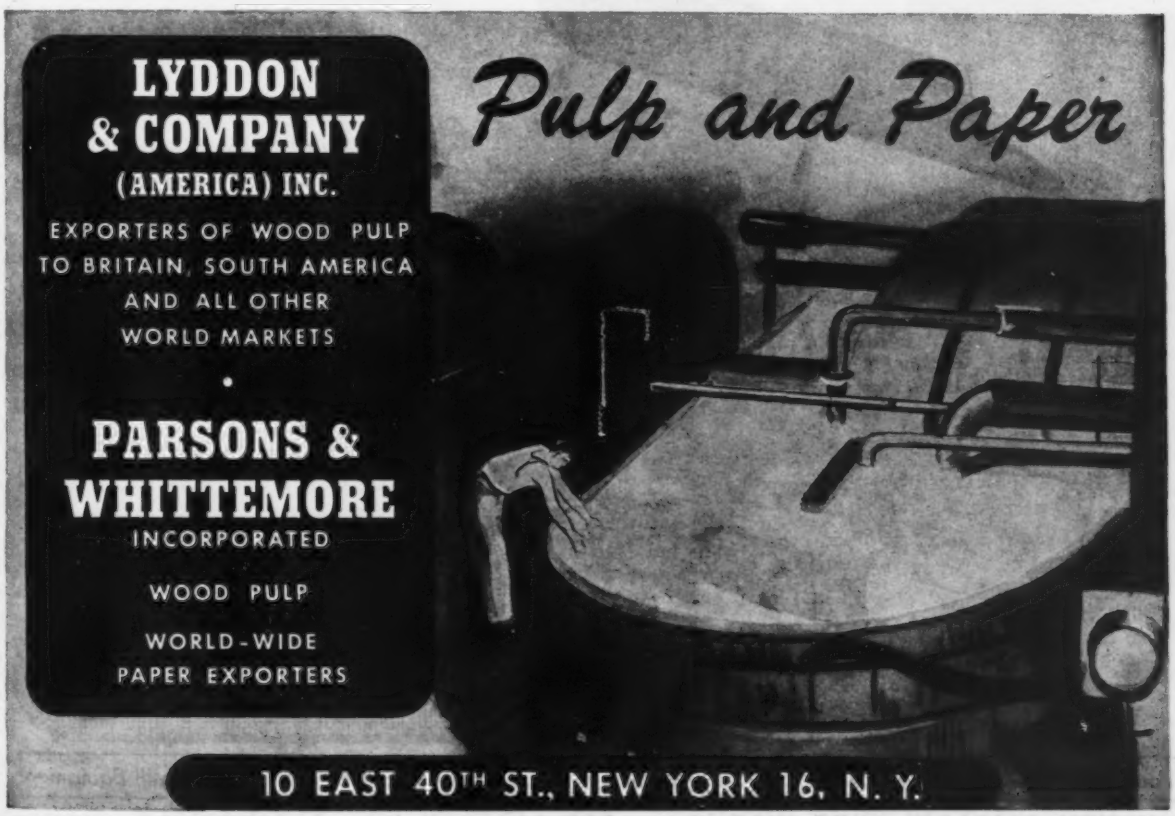
PAPERBOARD OPERATING RATIOS†

Current Weeks—1946		Corresponding Weeks—1945	
August 17	98	August 18	67
August 24	100	August 25	99
August 31	100	September 1	97
September 7	83	September 8	80
September 14	101	September 15	96
September 21	*100*	September 22	93

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Year Avg.
1945	91	95	97	97	96	96	86	90	91	97	95	85	93
1946	90	97	100	99	94	97	89	99					

* Based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available. Does not include mills producing newsprint exclusively.

† Per cents of operation based on "Inch-Hours" reported to the National Paperboard Association.



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122 E. 42nd St., New York 17, N. Y.
Edited by R. G. Macdonald, Secretary

Heat Transfer Calculations for Paper Machines*

By A. E. Montgomery[1]

Abstract

The method is outlined for determining the overall thermal conductivity coefficient for paper machine driers, and the local conduction coefficients are evaluated. It is shown that for all machines except the Yankee machine the contact conduction from drier shell to paper has the dominant effect on drying rate, but that on the Yankee drier the conductance through the drier shell has the greatest importance.

All TAPPI drying rate studies disclose a variation in drying rate for the same classification of paper and for the same steam pressure over a range of two to one. With apparently comparable conditions the better machine evaporates twice the amount of water per hour per square foot of drying surface as does the poor machine. How can there be such a wide variation? The purpose of the heat transfer calculations here outlined is to evaluate so far as possible the effect of the variables influencing drying rate.

To permit a mathematical approach to the mechanism of drying it is convenient to think of it simply as a problem of getting heat units into the paper web. The more rapid the transfer of heat units into the sheet the more rapid the drying will be.

Now the simple formula for heat transfer may be stated as:

$$Q = U \times A \times \Delta T \qquad (1)$$

where Q = heat transferred in B.t.u./hr.
U = overall coefficient of conductance in B.t.u./hr./sq. ft./°F. difference
A = area in square feet
and ΔT = temperature difference in °F. between the source of heat and the paper sheet.

It is obvious from this formula that for any paper machine the amount of heat transferred (which is to say the amount of water evaporated or paper dried) can be increased by: (a) increasing the coefficient of conductance, U, or (b) increasing the area by adding more driers, or (c) increasing the temperature difference either by raising the steam pressure, or by lowering the temperature of vaporization as is done by improved ventilation of such forced ventilation means as the Vapor Absorption System or the Grewin System. This paper will be concerned with a study of the factors entering into the overall thermal conductance, U.

* Presented at the Annual Meeting of the Technical Association of the Pulp & Paper Industry, Hotel Commodore, New York, N. Y., Feb. 25-28, 1946.

[1] Member TAPPI; Vice-president, J. O. Ross Engineering Corp.

Evaluation of Overall Conductance, U

It is a simple matter to calculate for any machine the approximate value of the conductance coefficient, U, for the average of all driers from the wet to the dry end of the machine. For an average paper machine the following may be assumed:

1. 15 p.s.i. steam pressure (250° F.).
2. Evaporative drying rate Rw = 2.0 pounds water per hour per square foot. This is taken from drying rate reports, and may range commonly from 1.2 to 2.6.
3. 1.5 pounds steam condensed per pound water evaporated.
4. 945 B.t.u. per pound steam condensed.
5. 95% of heat transmitted through drier surface covered by trim width.
6. Paper and air being heated having effective average temperature of 180° F. ΔT = 250 — 180 = 70. (This assumption is hard to prove, but surely the effective average temperature would be between 170 and 190° F. in most cases.)

The total heat transmitted from steam to paper and air being heated on this average machine is therefore $2.0 \times 1.5 \times 0.95 \times 945 = 2{,}700$ B.t.u. /hr. /sq. ft. and $U = 2{,}700/70 = 38.5$ B.t.u. /hr. /sq. /°F.

Using the extreme values for Rw of 1.2 and 2.6, and the extreme average values for ΔT of 60 and 80, it is found that U may vary from about 20 to 58.

At this point note that the overall conductance coefficient, U, is independent of steam temperature or paper temperature; hence if U were 40 for a given drier with one steam pressure it would still be 40 with any other pressure if other conditions affecting heat conductivity were unchanged. The overall conductance of the wet end driers versus the dry end driers is independent of the temperature difference between the steam inside and the paper and air outside, though of course greatly affected by differences such as a coating on the outside of the wet end driers or the poorer thermal contact of the paper with the dry end drier surface. The calculated overall conductance used here is the average for all driers, and to ascertain that for any individual drier or group of driers it would be necessary to know the amount of heat transmitted per unit of surface together with the temperature difference, ΔT, for that individual section.

Evaluation of Local Coefficients

For convenience in studying the effect of the numerous factors affecting the overall conductance or heat flow from steam within the drier to the sheet being dried it is necessary to study individually and evaluate the local coefficients of conduction. These are shown in Fig. 1 as follows:

h_1 = conductance of condensing steam.
h_2 = conductance of inside scale and dirt film.
h_3 = conductance of metal drier shell.
h_4 = conductance of outside scale or fuzz.
h_5 = conductance of paper and air contact.
h_c = $h_4 + h_5$, taken together, and which for convenience will be spoken of as the contact conductance.

An evaluation and study of these local conductances will make clear the realtive importance of each, and will make it possible to center an attack on those factors which have the greatest weight in determining the rate of heat flow and hence rate of drying. Remember a high local conductance is favorable and a low conductance is unfavorable.

Consideration of h_1

The range is normally 1500 to 2500, with average probably about 2000. Careful studies have been made in connection with evaporators and condensers and much accurate information is available. The conductance is affected by the following factors:

1. Dropwise versus film type condensation, the former giving 4 to 8 times the conductance. Dropwise condensation is promoted by a small concentration of oil in the steam.

2. Vapor velocity. It has been noted often that a high steam velocity localized over a portion of the width inside the drier will cause uneven drying across the sheet.

3. Turbulance of condensed water. Perhaps a small pool of condensed water wiping off the condensed film or drops with each revolution of the drier is advantageous. Certainly water carry-over in a high speed drier is very bad.

4. Presence of noncondensible vapors. With inadequate venting of noncondensible gases the concentration builds up rapidly, and h_1 decreases about as follows:

at 10% air by volume,	$h_1 = 1000$
at 20%	$h_1 =$ 600 to 800
at 30%	$h_1 =$ 300 to 600

Consideration of h_2

On some old driers the inside scale has been known to be 0.25 inch or more in thickness, but for the usual paper machine drier h_2 will range from 500 to infinity, with an average of perhaps 800. W. H. McAdams ("Heat Transmission," p. 274) writes: "Graphical analysis of overall coefficients for surface condensers gives scale-deposit coefficients of 760 before cleaning the inside surface, 1200 after cleaning with rubber plugs, 2000 after using a mechanical tube cleaner, and 4200 after sand blasting."

Consideration of h_3

The thermal conductivity K for some various metals in B.t.u./hr./sq.ft./°F./ft. at 212° F. is as follows:

Aluminum	120
Brass (70% copper)	60
Cast iron	27 to 30
Copper, pure	220
Steel	26

The conductivity h_3 for cast iron and copper may be tabulated thus:

Wall Thickness, in.	Cast Iron	Copper
½	680	5,280
1	340	2,640
1½	227	1,760
2	170	1,320
3	113	880

Consideration of h_c

The thickness of the drier shell is small in comparison to the drier diameter, hence the inside and outside areas are nearly enough equal to permit using the simple formula for heat transfer through a plane wall, and by using the assumed values for all other local conductivities except h_c to calculate the value of h_c itself.

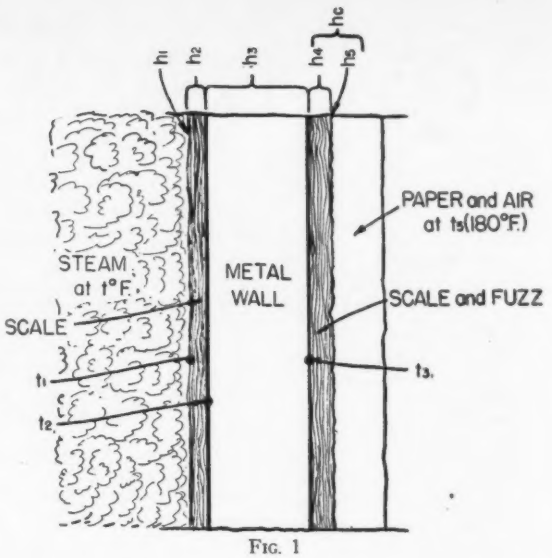

Fig. 1

$$U = \frac{1}{\frac{1}{h_1} + \frac{1}{h_2} + \frac{1}{h_3} + \frac{1}{h_4} + \frac{1}{h_5}} \qquad (2)$$

Using average values, (1 inch thick cast iron shells)

$$38.5 = \frac{1}{\frac{1}{2{,}000} + \frac{1}{800} + \frac{1}{340} + \frac{1}{h_c}}$$

Solving for h_c the value will be found to be 47.

In the same way, using the range of values for U of 20 to 58 but considering h_1, h_2, and h_3 constant as above, it is found that the contact coefficient h_c varies between 22 and 80.

The significant thing is the low conductivity from metal shell to paper compared to the other conductivities. Put in other words, the rate of drying is determined to a much greater extent by conditions affecting the flow of heat from drier shell to paper than by any other conditions. This can not be overemphasized. All studies of drying further convince one that next, perhaps, to steam pressure itself, no other variable so influences the drying rate as the effectiveness of contact between the metal drier shell and the paper web. The conditions which affect contact are therefore worthy of detailed consideration. Some of these are:

1. Condition of drier surface. Papermakers know the value of doctors yet there are many machines on which the drying rate could be greatly improved by more effectively cleaning and polishing the outer drier surface.

2. Condition of paper surface. The difference in drying rates between different classifications or grades of paper and board is often explainable by the difference in the paper surface and its ability to make effective contact with the drier shell. The drying rate on a Yankee drier without predrying is five times as great as on the usual multicylinder drier section because of the good contact offered by the polished drier surface and the receptive paper surface. A smoothing press at the wet end or a breaker stack in the drier nest materially improves the evaporative drying rate.

3. Moisture content of paper. The wetter the sheet the more readily will heat flow into it. The contact conductance at the wet end driers must be several or many times as high as on the dry end driers.

4. Tightness of draws. The least perceptible slackening of even one draw in a drier section will noticeably detract from the drying rate. High drying rates require uniformly tight draws. On board machines where no felts are available to improve paper contact this matter of draws is especially important, and the driers must be concentric and properly alligned if a good drying rate is to be secured.

5. Diameter of driers. Small diameter driers have an advantage over large diameter in that for a given web tension the unit area pressure of the web upon the drier surface is greater.

6. Tightness of drier felts. A factor of considerable importance and worthy of more study.

7. Speed. Drying rate studies have proven that the long, fast machine tends to have a lower drying rate than the slow machine, all other conditions being the same. The reason is the poorer contact between the drier and paper surfaces on the fast machine because of the film of air drawn in at the nip.

Calculation of Temperatures

When a machine is drying in a state of equilibrium it is obvious that the same amount of heat per unit area flows in series through each of the local conductances, from which it follows that

$$U\,(t-t_3) = h_1\,(t-t_1) = h_2\,(t_1-t_2) = h_3\,(t_2-t_3) = h_c\,(t_2-t_3) \quad (3)$$

where the location of the various temperatures and conductances are as shown in Fig. 1.

For the average conditions assumed earlier the conditions are tabulated below from which the calculated temperatures are found by substitution and simple algebraic solution.

Given		Calculated
$U = 38.5$	$h_2 = 800$	$t_1 = 248.6°$ F.
$t = 250°$ F.	$h_3 = 340$	$t_2 = 245$
$t_3 = 180$	$h_c = 47$	$t_3 = 236$
$h_1 = 2000$		

Note that with these assumed average conductances the temperature drop from the body of the 250° F. condensing steam to the inner dirt film is only 1.4°, and from the body of the steam to the inside of the metal shell is 5°. Through the 1-inch thick drier shell it is 9°, but from the metal to the paper the temperature drop is 56°.

For any other machine conditions, different drier shell thickness, steam pressure, or other assumed conductances it is a simple and instructive problem to calculate the surface temperatures and temperature drops.

As an illustration of the usefulness of this manner of calculation suppose one desired to heat this average drier with hot dry air instead of steam. The problem is to find what maintained air temperature would be required to effect the same drier temperature and hence the same heat flow and production. The conductance of air to metal with 1,400 feet per minute air velocity (15 miles per hour) may be taken as 6.0. t_2 as before equals 245.

$$2{,}700 = 6.0\,(t-245)$$
$$t = 695°\text{ F.}$$

TABLE I

Shell Thickness, in.	h_3	Values of U Poor (h_c=22)	Av. (h_c=47)	Good (h_c=80)
½ cast iron	680	20.5 = 103%	40.8 = 106%	63.6 = 109%
1	340	19.9 = 100%	38.5 = 100%	58.1 = 100%
2	170	18.8 = 95%	34.6 = 90%	49.6 = 85%
3	113	17.8 = 90%	31.3 = 81%	43.2 = 74%
½ copper	5280	21.1 = 106%	43.0 = 112%	69.2 = 119%
1	2640	21.0 = 106%	42.6 = 111%	68.4 = 118%
2	1320	20.8 = 105%	42.0 = 109%	66.6 = 115%

TABLE II.—YANKEE DRIER

Shell Thickness, in.	h_3	Value of U
1 cast iron	340	164 = 149%
2 cast iron	170	110 = 100%
3 cast iron	113	83 = 75%
1 copper	2640	279 = 254%
2 copper	1320	252 = 229%
3 copper	880	230 = 209%

Study of Effect of Drier Shell Thickness on Heat Flow

Suppose it is desired to know the effect on drying capacity of using a different thickness or material of drier shell, all other conditions being unchanged. In the general formula (2) use the previously assumed values for h_1 and h_2 and the calculated values for h_c. Then

$$U = \frac{1}{\frac{1}{2{,}000} + \frac{1}{800} + \frac{1}{h_3} + \frac{1}{h_c}}$$

Solving this equation the values for U are tabulated in Table I for what may be called poor, average, and good drying rates, and the relative drying rate is shown as a percentage of that for a 1-inch thick cast iron drier shell.

From observation of Table I it is evident that the thickness of drier shell is not especially important where a low contact coefficient causes a low heat transfer or drying rate, but with good contact and a high drying rate a thin shell or one of a more conductive metal gives an important increase in heat transfer and consequent drying rate.

An incident brought to the author's attention recently points the moral most vividly. In the textile industry driers similar to paper machine driers are common, but these have always been built of small diameter and with thin walls of copper which usually will withstand only 5 to 10 pounds steam pressure. One more enterprising manufacturer, aware of the millions of dollars invested in driers by the paper industry, and desirous of getting more rapid drying, took out the supposedly obsolete light weight "can driers" and installed regular paper machine driers designed to carry 50 pounds steam pressure. To his surprise and disappointment he was able with the much higher steam pressure to dry less than before, consequently replaced them with the original old copper "cans" and low pressure steam.

The Yankee Drier

Similar calculations of heat flow for the Yankee drier lead to a most interesting conclusion with respect to drier shell material or thickness. The Yankee drier operating in the usual manner with a wet sheet heavily pressed onto the surface has an evaporative drying rate, R_w, averaging about 10.0 pounds per hour per square foot with a steam pressure of 43 p.s.i. (290°F.). Assume now the paper at a mean effective temperature of 180°F., the temperature difference, ΔT, equals 110°. Assume further 1.4 pounds steam per pound of water evaporated, and 917 B.t.u. released per pound steam condensed, the heat transmitted equals 10.0 times 1.4 times 0.95 times 917= 12,100 B.t.u./hr./sq.ft.

U=12,100/110=110 B.t.u./hr./sq.ft./deg. difference. If h_1=2,000, h_2 (clean)=1500, h_3 (2-inch cast iron shell)=170, solution by equation (2) shows h_c =500. If a value of 1.5 pounds steam per pound water evaporated is used instead of 1.4 the value of h_c figures out to be 740. At any rate the contact conductivity is relatively very high as is to be expected. Using the value of 500 for h_c and assuming this heat flow to have taken place with a 2-inch thick

cast iron drier shell, the resulting value for the overall conductivity, U, is shown in Table II for other thicknesses of cast iron, and to illustrate the possible increase in drying capacity by use of a more conductive metal it is also shown for copper. The percentage column indicates the drying capacity relative to 2-inch cast iron.

A practical substantiation of this theoretical conclusion is afforded by the fact that as Yankee driers have been designed for higher and higher steam pressures a point was reached where little or no gain in drying effect resulted, the advantage of the higher steam pressure with increased available overall temperature drop (ΔT) being offset by the increase in temperature drop through the thicker drier shell made necessary by the increased steam pressure. The obvious step would seem to be the use of a more conductive metal permitting higher drying rate with even reduced steam pressure, but this is a problem for the machine builder who is limited to a material which will retain the required polished surface and accurate concentricity.

Conclusion

The values for conductances given in the preceding calculations are not intended to be authoritative or to apply to every machine, but rather to be sufficiently accurate approximations. They do serve to clarify ones thinking regarding the relative importance of the many factors which taken together determine the drying rate of each individual paper machine.

New TAPPI Members

The Executive Committee of the Technical Association of the Pulp and Paper Industry has elected the following to membership:

Siegfried Aeschbacher, Superintendent, Utzenstorf Paper Mill, Utzentorf, Canton Berne, Switzerland, a 1935 graduate of Swiss Technical High School.

Leslie H. Andrews, Development Chemist, Northern Paper Mills, Green Bay, Wisconsin, a 1932 graduate of the University of Pittsburgh.

Andre Berges, Chief Engineer, Papeteries de Gascogne, Mimizan, Landes, France, a 1912 graduate of the Institut Toulouse.

Isidor M. Bernstein, Director, National Printing Ink Research Institute, Lehigh University, Bethlehem, Pennsylvania. He attended the University of Chicago, the University of Cincinnati, and the Armour Institute of Technology.

Francis Bolam, Secretary, Technical Section of the Paper Makers' Association of Great Britain and Ireland, Inc., London, England, a 1932 graduate of the University of Durham.

Henry W. Borman, Industrial Engineer and Assistant Consulting Engineer, Southern Paperboard Corp., Savannah, Georgia, a 1939 graduate of Rensselaer Polytechnic Institute.

John E. Bramlett, Chemical Engineer, Champion Paper and Fibre Co., Canton, North Carolina, a 1941 graduate of North Carolina State College.

Pao-Po Chen, Technical Trainee, Marathon Corporation, Rothschild, Wisconsin, a 1940 graduate of the University of Nanking.

George L. Clarke, Staff Pulp Superintendent, Kimberly-Clark Corp., Neenah, Wisconsin, a 1939 graduate of the Institute of Paper Chemistry.

Jacques Crouau, Technical Manager and General Secretary, Papeteries de Gascogne, Mimizan, Landes, France, a 1925 graduate of Ecole Centrale A & M, Paris.

A. Benedict Doran, Vice-President, Thorsen Products Corp., New York, N. Y., a 1939 graduate of Harvard University.

D. Robert Erickson, Consulting Chemist, Kalamazoo, Michigan, a 1927 graduate of the University of Illinois.

Frank V. Feorello, Technical Representative, Barrett Division, Allied Chemical & Dye Corp., New York City, a 1942 graduate of the University of Michigan.

G. A. Frank, Engineer, Papeteries de Gascogne, Mimizan, Landes, France, a 1935 graduate of Institut Electrotechnique Grenoble.

John H. Gillies, Packaging Engineer, Ansco. Division, General Aniline and Film Corp., Binghamton, New York, a 1930 graduate of the University of Glasgow.

Raymond E. Griggs, Electrical Engineer, General Electric Co., Schenectady, New York, a 1930 graduate of the University of Utah.

Clifford W. Guertin, Research Chemist, American Bank Note Co., Bronx, New York. Attended Pratt Institute School of Science and Technology.

Ralph S. Hayden, Control Chemist, Fox River Paper Corp., Appleton, Wisconsin, a 1935 graduate of American International.

Richard C. Ihde, Student, New York State College of Forestry, Syracuse, New York.

Aaron D. Johnson, Manager, Technical Service, E. I. duPont deNemours & Co., Grasselli Chemicals Dept., Wilmington, Delaware, a 1939 graduate of Indiana University.

Emmett P. Kavanaugh, Assistant Plant Engineer, Bartgis Brothers, Ilchester, Maryland, a 1943 graduate of the University of Maryland.

Laurant J. LaBrie, Technical Director, Paisley Products, Inc., and Morningstar, Nicol, Inc., New York, N. Y., a 1926 graduate of the University of Pennsylvania.

Leo T. Meyers, Superintendent, Waterproof-Ohio Paper Co., Columbus, Ohio, a 1929 graduate of Loras College.

Albert J. Miller, Foreman of Laboratory, Container Corp. of America, Chicago, Illinois. Attended Northwestern University.

Charles N. Ridley, Chief Chemist, Thomas Owen & Co. Ltd., Ely Paper Works, Cardiff, Wales, a 1920 graduate of the University of Durham.

Western N. Y. TAPPI Will Meet With Canadians October 9

A joint meeting of the Western New York Group of the Empire State Section of T.A.P.P.I. and the Niagara Branch of the Canadian Pulp & Paper Association, Technical Section, will be held at the Prospect House, Niagara Falls, N. Y. on October 9th at 6:45 p.m.

Dr. J. A. Van den Akker will address the meeting. His subject will be "Instrumentation in the Manufacture of Paper." Dr. Van den Akker graduated from the California School of Technology.

He has worked at the Institute of Paper Chemistry, Appleton, Wisconsin, since 1935, and is presently head of the Physics Department. Instrument study and evaluation come under his jurisdiction. The very thorough way in which he handles this work assures an interesting and informative meeting.

Application of the Differential Manometer to the Measurement of Fluid Density and Specific Gravity with Special Reference to Temperature Effects*

By Robert D. Cowherd[1]

Abstract

The necessity for temperature considerations in relating density measurements to concentration of liquid solutions is stressed.

A differential manometer method of density measurement, refered to base temperature conditions, is developed for solutions of constant temperature.

Design equations are developed for an ambient temperature-compensated, external, mercury counterpoise to replace the water counterpoise.

Automatic density compensation for sample temperature variations is introduced by a pressure additive device.

The ability of the concentric sample and counterpoise chamber to compensate, automatically, the density measurement for sample temperature changes is analysed for three, separate situations.

The abilities of all methods of temperature compensation to correct the density measurement to base conditions on a sample temperature change are shown graphically.

In the recent past, material balances in continuous processes have had scant industrial attention. Previously, solution concentrations have been controlled by intermittent hydrometer readings. The net effect produced is the discovery of a concentration change after it has occured and the subsequent necessity for process readjustment.

Since density is a dependent variable with respect to dissolved solids, why has it not been more widely used as a concentration index? The measurement of density cannot be related to concentration if the effects of solution temperature variations are not corrected to a common thermal base.

The above is particularly applicable where density is used as an automatically-controlled process variable. For example a controller is throttling its valve such that for a given temperature the density, and hence concentration, is correct. A solution temperature rise occurs such that the density decreases. The concentration is the same, and yet the pen of the instrument is below its set-point trying to restore the variable to its original value at the new temperature. The net result is an increase in the process dissolved solids. Yet, the instrument chart shows that no change in concentration has occurred.

It is, therefore, imperative that the effects of temperature variations be considered if density is to be related to concentration in the manual or automatic control of this variable.

Use Of A Differential Manometer In Uncompensated Measurement

The terms, density and specific gravity, have been loosely used both in scientific literature and in actual engineering design.

Density may be defined as the weight of a substance per unit of volume at a given temperature.

Density is a term which has very definite dimensional units. They are: WL^{-3} at temperature t_1, where W is the weight of a substance, enclosed in a cube, whose side is length L, and t_1 is the temperature at which the measurement was made, e.g. the density of water expresed as 62.43 pounds/cubic foot at 39.16°F.

Specific gravity may be defined as the ratio of the density of a substance at a given temperature, to the density of some arbitrarily-chosen, standard substance at a given temperature.

Since specific gravity involves a ratio of densities, the resulting value has no basic units of weight and length. Therefore, specific gravity has only the temperatures, at which the densities are measured, to completely define it.

Dimensionally, therefore, specific gravity is:

$$\frac{W\,L^{-3}\text{ at }t_1}{W\,L^{-3}\text{ at }t_2} = S^{t_1/t_2}$$

It is, therefore, apparent that unless the term t_1/t_2 is specified, a specific gravity measurement is meaningless.

To apply that which is described above, the use of the differential manometer in the measurement of density and specific gravity will now be considered (See Fig. 1)

The counterpoise chamber A and the sample chamber B are supplied with the counterpoise liquid and the sample fluid respectively. The tops of the chambers are sharply ground to form weirs, which construction insures a constant head for any one liquid put through.

Overflows C and D are provided such that the two liquids may be returned to the process or other end points. Hydrostatic tubes I and J are immersed in the counterpoise and sample chambers to a length which depends on factors shortly to be discussed. In the end of each tube there is placed a hole such that when a source of clean, dry air is applied at points K and L, an air stream will emerge against the head of fluid above the hole. The back pressure created in tubes I and J will be equivalent to the head of liquid against which bubbling occurs. These pressures are

* Presented at the Annual Meeting of the Technical Association of the Pulp & Paper Industry, Hotel Commodore, New York, N. Y., Feb. 25-28, 1946.

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connected to a standard meter body E normlly used for flow measurement.

The low pressure side F of the meter body is connected to the counterpoise tube I, and the high pressure side G is connected to the sample tube J.

The basic principle of operation is as follows: in the measurement of liquid level at a definite temperature, the density of the fluid is assumed to be constant. The back pressure in a bubbler tube immersed in the liquid will, therefore, vary with a change in head.

In the case of density measurement, the level is maintained constant by virtue of the overflow weirs. The back pressure in the bubbler tube will then vary with the change in density of the liquid into which it is immersed.

The use of a counterpoise chamber is a successful effort to narrow the range of the measurement or to utilize full chart travel for the change in density required.

The next interest is a method for the computation of the physical lengths of tubes I and J. The basic assumptions are:

(a) the temperature of the counterpoise liquid is constant.

(b) the temperature of the sample liquid is constant.

(c) the physical lengths of tubes I and J are those as measured at the temperature of the liquids.

(d) the rate of air flow in the tubes I and J is equal such that any pressure drop across the bubbler holes will be equal.

t_1 = temperature of the sample liquid in chamber B.
t_2 = temperature of the sample density measurement from which a specific gravity value S^{t_2/t_3} was derived.
t_3 = temperature of the water density measurement to which the sample is referred to obtain a specific gravity ratio of S^{t_2/t_3}.
t_4 = temperature of the counterpoise liquid in chamber A.
$S_1^{t_2/t_3}$ = minimum chart reading of specific gravity; the absolute density of the liquid measured at t_2, and compared to the absolute density of water or reference substance at t_3.
$S_2^{t_2/t_3}$ = same as $S_1^{t_2/t_3}$, except it is the maximum chart value of specific gravity.
h^{t_1} = the length of the J tube in the sample chamber B at a sample liquid temperature t_1.
h^{t_4} = the length of the I tube in the counterpoise chamber A at a counterpoise liquid temperature t_4.
$d_1^{t_1}$ = the absolute density of the sample liquid in chamber B, at a temperature t_1 of the sample liquid, and at a chart minimum value of $S_1^{t_2/t_3}$.
$d_2^{t_1}$ = the same as $d_1^{t_1}$, except for a chart maximum value of $S_2^{t_2/t_3}$.
D^{t_3} = the absolute density of the reference substance at a temperature t_3.
D^{t_4} = the absolute density of the counterpoise liquid at a temperature t_4 in the chamber A.
R = the range of the meter body.

Several facts must be kept in mind:

(a) When obtaining hydrostatic pressures from physical dimensions, the density at the temperature of the liquid must be used and not its specific gavity, *hd* is pressure and not *hs*.

(b) If temperatures t_1 and t_4 remain constant, a recorder chart may be made to read any t_2/t_3 value of specific gravity. Hence, a specific gravity meter does not measure specific gravity. It measures density!

The following analysis will prove the above statement:

The range to be recorded on the instrument is: $S_1^{t_2/t_3}$ *to* $S_2^{t_2/t_3}$.

The fact remains that the conditions in the sample chamber B may not be at a temperature t_2, but at a temperature t_1. Hence, the actual range will be: $S_1^{t_1/t_3}$ *to* $S_2^{t_1/t_3}$. These latter values may be obtained from a chart showing the temperature effects on the material, the density of which is to be measured.

To obtain the hydrostatic head in tube J, the values

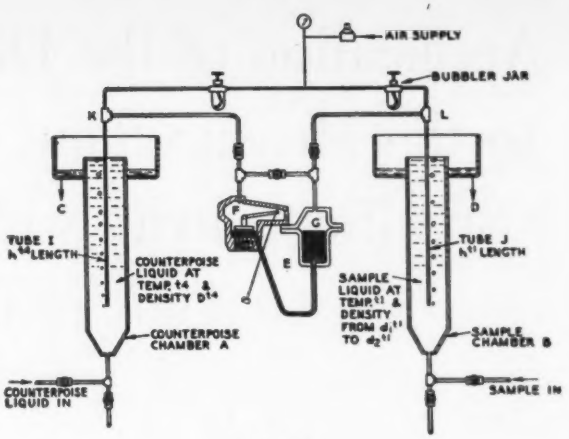

FIG. 1

of $S_1^{t_1/t_3}$ and $S_2^{t_1/t_3}$ must be converted to their equivalent absolute densities at temperature t_1.

Hence, $d_1^{t_1} = S_1^{t_1/t_3} \cdot D^{t_3}$ and $d_2^{t_1} = S_2^{t_1/t_3} \cdot D^{t_3}$

If the pen-arm of the instrument is to have a full chart movement, the difference between the hydrostatic heads $h^{t_1}.d^{2t_1}$ *and* $h^{t_1}.d_1^{t_1}$ should equal the range of the meter body R.

$$\text{Thus, } h^{t_1} \cdot d_2^{t_1} - h^{t_1} \cdot d_1^{t_1} = R \tag{1}$$

$$h^{t_1} = \frac{R}{d_2^{t_1} - d_1^{t_1}} \tag{2}$$

To derive the equation for the length of the counterpoise tube I, the zero position of the pen must be considered (see Fig. 1). At chart zero or at the minimum density $d_1^{t_1}$, the pressure in G, of the differential meter body B, will equal that in F.

At chart zero, the pressure in G is: $h^{t_1}.d^{t_1}$.

The pressure in the counterpoise tube I, equivalent to $h^{t_1}.d^{t_1}$, must be $h^{t_4}.D^{t_4}$.

$$\text{Hence, } h^{t_4} \cdot D^{t_4} = h^{t_1} \cdot d^{t_1} \tag{3}$$

$$\text{And, } h^{t_4} = \frac{h^{t_1} \cdot d_1^{t_1}}{D^{t_4}} \tag{4}$$

The subject of units now arises. In equation (2), densities are usually given in the metric units of grams/cc. The range of the meter body R is always specified in inches of water pressure at 60°F. There is no reason to believe that metric and English units can be mixed together, and h^{t_1} will fall out in inches of physical length. If R is specified in grams/cm.^{2} densities in grams /cc.; then h^{t_1} will be in centimeters.

If R is in inches of water pressure and $d_2^{t_1}$ are in grams/cc. the following dimensional treatment will apply:

$$h^{t_1} \text{ in.} = \frac{\dfrac{(R) \text{ in.} \cdot \text{cm.} \cdot \text{grams}}{\text{in.} \quad \text{cm.}^3}}{\dfrac{(d_2^{t_1} - d_1^{t_1}) \cdot \text{grams}}{\text{cm.}^3}} = \frac{\text{in.} \cdot \text{cm.}}{\text{in.}} = \frac{\dfrac{\text{cm.}}{\text{in.}}}{\dfrac{\text{cm.}}{\text{in.}}} = \text{inches}$$

$$h^{t_1} \text{ in.} = \frac{RK}{d_2^{t_1} - d_1^{t_1}} \tag{5}$$

Where:
K = the density of water at the calibration temperature base T for the meter-body, pressure range. K at 60° F. is 0.999013 grams/cm.^{3}.
R = the range of the meter body in inches of water pressure at the calibration, temperature base T.
$d_1^{t_1}$ and $d_2^{t_1}$ = are absolute densities defining the range of measurement in grams/cm.^{3} at the temperature t^1 existing in the sample chamber B.

$$\text{For } K \text{ at } 60° \text{ F.: } h^{t_1} = \frac{R \cdot 0.999013}{(d_2^{t_1} - d_1^{t_1})} \tag{6}$$

The fact that K at 60°F. is so near unity is, therefore, only a coincidence. Had R been expressed in inches of mercury pressure, the constant K would have been far from 0.999013.

An inspection of equation (4) reveals that h^{t4} will assume the units of h^{t1}, since h^{t1} is multiplied by a ratio of densities of like units to obtain h^{t4}.

The basic equations (4) and (6) have been developed for the case where sample and counterpoise, liquid temperatures t_1 and t_4 are constant. These equations will apply to all liquids for which constants of density are known. There is no reason to assume that only water should be used in the counterpoise chamber A. An inspection of equation (4) shows, that h^{t4} will vary at the ratio d_1^t / D^{t4} times h^{t1}. This means that any counterpoise liquid may be used, so long as the correct value for D^{t4} is obtained. The counterpoise is only a means for establishing a datum pressure. It is thoroughly possible that a pressure regulator will be used for this function in the future.

Figure 2 shows a density measuring apparatus where the counterpoise is a mercury column. A method will here be given whereby a mercury, or any other type of counterpoise pressure, may be compensated for ambient temperature changes.

Automatic Temperature Compensation of the Counterpoise Chamber A

By referring to Fig. 3, a generalized set of conditions may be imposed for the analysis. If the container has no appreciable coefficient of expansion, the weight of the counterpoise liquid and the diameter of the container may be so chosen, that if the ambient temperature increases above a fixed datum temperature, the decrease in counterpoise liquid density will exactly offset the increase in head due to expansion.

If the container has no appreciable coefficient of expansion, the reverse is also true. The weight of the counterpoise liquid and the diameter of the container may be so chosen, that if the ambient temperature decreases below a fixed datum temperature, the increase in counterpoise liquid density will exactly offset the decrease in head due to contraction.

The following symbols will be used:

t_4 = datum temperature of the liquid in the counterpoise chamber A.
t_6 = temperature above t_4 of the liquid in the counterpoise chamber A.
D^{t4} = datum density of the liquid in the counterpoise chamber at t_4.
D^{t6} = density of the counterpoise liquid at t_6.
c^{t4} = volume of a unit mass of counterpoise liquid at t_4.
c^{t6} = volume of a unit mass of counterpoise liquid at t_6 above t_4.
h^{t4} = immersion distance of the tube I in the counterpoise liquid at the datum temperature t_4.
ΔV_A = change in volume of the counterpoise liquid at temperature t_6 above t_4.
Δh_A = head change derived from ΔV_A.
Y_A = weight of liquid in the counterpoise chamber A.
R_A = inner radius of the counterpoise leg A.
r_A = outer radius of the tube I immersed in the counterpoise liquid in chamber A.

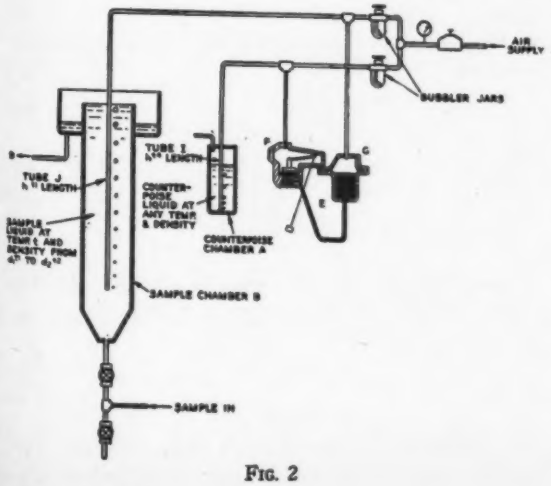

FIG. 2

The first statement of the problem will be used in the development to follow; that is, the ambient temperature has increased above a counterpoise, liquid, datum temperature.

$$\text{Therefore, } h^{t4} \cdot D^{t4} = (h^{t4} + \Delta h_A) \cdot D^{t6} \tag{7}$$

Δh_A may be derived from ΔV_A for Y_A weight of counterpoise liquid.

$$\text{Thus, } (c^{t6} - c^{t4}) \cdot Y_A = \Delta V_A \tag{8}$$

Since the effective expansion area in annular,

$$\Delta h_A = \frac{\Delta V_A}{\pi(R_A^2 - r_A^2)} = \frac{Y_A(c^{t6} - c^{t4})}{\pi(R_A^2 - r_A^2)} \tag{9}$$

By substituting the value for Δh_A in equation (7), there results:

$$Y_A = \frac{\pi(R_A^2 - r_A^2) \cdot h^{t4} \cdot (D^{t4} - D^{t6}) \cdot c^{t6}}{(c^{t6} - c^{t4})} \tag{10}$$

To fix the physical dimensions of tube I, the distance n must be determined. For the section shown in Fig. 3, a volume balance gives:

$$h^{t4} \cdot \pi(R_A^2 - r_A^2) + n\pi(R_A^2 - r_A^2) = \frac{Y_A}{D^{t6}} \tag{11}$$

$$\text{From which: } n = \frac{Y_A - D^{t6} \cdot h^{t4} \cdot \pi(R_A^2 - r_A^2)}{D^{t6} \cdot \pi(R_A^2 - r_A^2)} \tag{12}$$

If the value of Y_A, as given in equation (10), is substituted in equation (12); n=O.

The fact that n is zero for a cylindrical section has some interesting implications:

(a) the cross-sectional shape of the container can be of any type. The container must, however, maintain this section over its complete vertical distance, $(h^t + \Delta h)$.

(b) the cross-sectional area of the container can be any value. The area must be constant over the entire length, $(h^t + h)$.

(c) the hole, from which air is bubbled against a head, $(h^t 4 + \Delta h)$, must be on the bottom of the container.

(d) the exact amount of counterpoise liquid for automatic temperature compensation of the counterpoise will be determined by the creation of a back pressure in tube I equal to $(h^t 4 \cdot D^t 4)$ at any temperature $t6$.

For the case where the cross-sectional area of the container is not constant, n will have a value greater than zero. (See Fig. 4.)

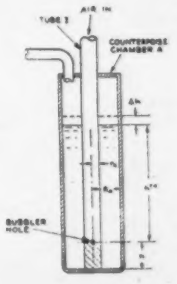

FIG. 3

Automatic Temperature Compensation for the Sample Chamber B

In the previous discussion, a method has been developed, whereby a density range at some temperature datum t_2 could be measured for a sample temperature t_1. As long as the sample temperature t_1 remains constant, a true measurement at the datum t_2 will result. If the sample deviates from t_1, the above no longer is true, and the density measurement must be corrected in the amount of the deviation away from t_1.

If the temperature deviation is above t_1, the density will drop for the same concentration of sample liquid in the chamber B (see Fig. 2). For a constant head in the chamber B, the pressure in the tube J will drop. Since the datum pressure on the F side of the differential manometer is fixed, the differential pressure will be less, and the pen will record the result of the temperature rise.

If the density measurement is to be compensated for thermal changes in the sample liquid, some means must be provided to add or subtract an increment of pressure to or from the F side of the differential manometer in an amount equivalent to the effect of the sample, temperature deviation in the correct direction.

Such a device is shown in the complete pneumatic circuit in Fig. 5, and in detail, in Fig. 6. The compensator tube K is immersed in the liquid contained in the sample chamber B. The liquid inside of the compensator K is subjected to the same temperature variations as those which occur in the sample fluid.

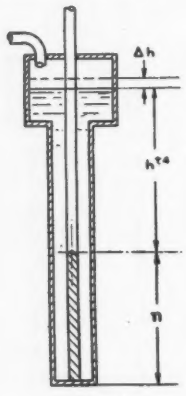

FIG. 4

Figure 6 shows the constructional features. The container and tube L are fabricated from low expansion coefficient material in order to maintain the physical dimensions, even though temperature changes occur. Above the bubbler hole exists a tube through which air is admitted to the device. Below the hole is a solid, metal rod. A sample

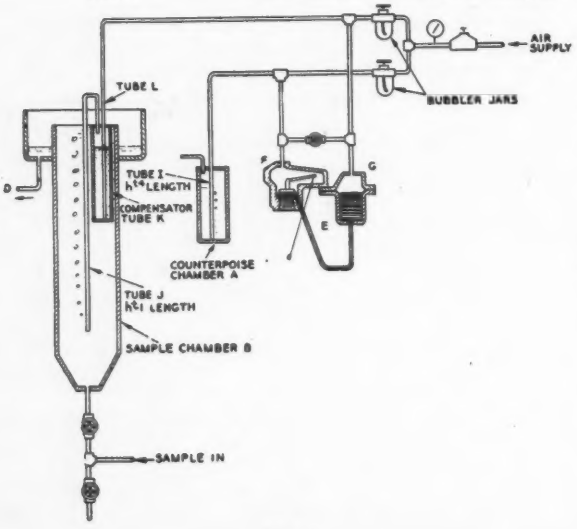

FIG. 5

temperature datum is chosen at such a value that operating temperatures will always be above the datum and the required J tube computed.

At the chosen datum temperature, the compensator liquid level will be at the bubbler hole. Sshould the sample temperature rise above this datum temperature, the compensator liquid will expand. In flowing through the system, the air stream must not only overcome the J tube head, but also the compensator, expansion head.

It is necessary, therefore, to compute the weight of compensator liquid whose expansion, and subsequent density decrease with a sample temperature rise, will add a pressure to the manometer equivalent to the sample density decrease.

The following symbols will be used:

t_1 = datum temperature of the compensator tubes K and J, and hence, sample liquid.

t_2 = limit of temperature rise above t_1 of the compensator tube K and sample liquid.

d^{t_1} = datum density of the liquid in the sample chamber B, used for computation of the weight of compensator liquid.

d^{t_2} = density of the same liquid as d^{t_1} in the sample chamber B at the limit of temperature rise t_2 above t_1.

D^{t_2} = density of the compensator liquid at a temperature t_2 above t_1.

$P_J^{t_1}$ = datum pressure in the tube J immersed in the sample liquid in chamber B at the datum temperature t_1.

$P_J^{t_2}$ = pressure in tube J immersed in the sample liquid in chamber B at the temperature t_2.

c^{t_1} = volume of a unit weight of the compensator liquid at the datum temperature t_1.

c^{t_2} = same as c^{t_1}, except at a temperature t_2 above t_1.

h^{t_1} = physical immersion distance of the J tube in the sample liquid in chamber B at the datum temperature t_1.

Y_K = weight of compensator tube liquid.

R_K = inner radius of the compensator tube K.

r_K = outer radius of the tube L immersed in the liquid of the compensator tube K.

The pressure in tube J at temperature t_1 will be:

$$P_J^{t_1} = h^{t_1} \cdot d^{t_1}$$

The pressure in tube J at temperature t_2 will be:

$$P_J^{t_2} = h^{t_1} \cdot d^{t_2}$$

The change in pressure in the tube J after a temperature rise from t_1 to t_2 will be:

$$\Delta P_J = P_J^{t_1} - P_J^{t_2} = h^{t_1} \cdot (d^{t_1} - d^{t_2}) \qquad (13)$$

Since ΔP_J must equal Δh_B of the compensator tube K in terms of that liquid at D^{t_2},

$$\text{Then: } \frac{\Delta P_J}{D^{t_2}} = \Delta h_B = \frac{h^{t_1}\ (d^{t_1} - d^{t_2})}{D^{t_2}} \qquad (14)$$

The expansion Δh_B of Y_K mass of compensator liquid may be written:

$$\Delta h_B = \frac{Y_K\ (c^{t_2} - c^{t_1})}{\pi (R_K^2 - r_K^2)} \qquad (15)$$

Equating (14) and (15) an expression for Y_K weight of compensator liquid results:

$$Y_K = \frac{\pi (R_K^2 - r_K^2)\ h^{t_1}\ (d^{t_1} - d^{t_2})\ c^{t_2}}{(c^{t_2} - c^{t_1})} \qquad (16)$$

The physical value of n may be obtained from a volume balance of the compensator tube K.

$$n\pi\ (R_K^2 - r_K^2) = \frac{Y_K}{D^{t_1}}$$

$$n = \frac{Y_K}{D^{t_1}\ \pi (R_K^2 - r_K^2)} \qquad (17)$$

By referring to the TAPPI data sheet on the change in Baumé of black liquor with temperature,

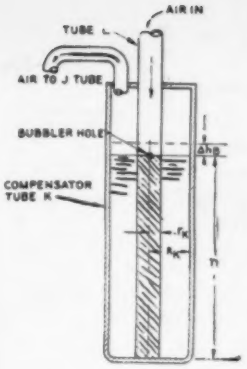

FIG. 6

it is apparent that the slopes of the constant concentration lines change with concentration. Or, the change in Baumé per degree Fahrenheit changes with concentration. It is, therefore, apparent that 100% compensation for temperature change will not occur over the entire range of the meter.

It is necessary to choose a value of Baumé within the range of the measurement at which 100% temperature compensation is required. This will be a value most important relative to the process characteristics, and should occur in the upper 50% of the chart for maximum control or record value. Y_K, in equation (16) is, therefore, evaluated from this data.

The following data, common to all the subsequent illustrations, will be used to compare the various thermal effects on density measurements:

(a) The range of the differential meter body is 10 inch water at 60° F.
(b) The recorded Baumé range will be $15^{60/60}$ — $30^{60/60}$ Bé.
(c) The density of water at 60° F. is 0.999013^{60}.
(d) $25^{60/60}$ Bé is the value at which 100% compensation is desired.
(e) $t_2 = 60°$ F. and $t_3 = 60°$ F.
(f) The absolute density of water at 60° F. is 0.999013^{60}.
(g) The inner radius of the compensator tube is ¼ inch.
(h) The outer radius of the bubbler tube is $\frac{3}{16}$ inch.
(i) TAPPI data for black liquor was used throughout.
(j) Four values of the chart range will be compared, namely: 15, 20, 25, and 30° Bé.

Refer to Fig. 7, 8, and 9. AB, AE, AH, and AK are lines of constant Baumé.

In Fig. 7 and 9; AD, AF, AI, and AL are lines showing the uncompensated Baumé deviations with temperature above 60°F.

Figure 8 will be discussed later.

In the data presented in Fig. 7, the base temperature was assumed to be: $t_1 = 60°$F.

The upper limit of compensation, $t5$, was chosen to be 140°F.

The length of the bubbler tube h^{t_1} is calculated from equation (6):

$$h^{t_1} = \frac{0.999013\,R}{d_5^{t_1} - d_1^{t_1}} = 68.74 \text{ inches or } 174.602 \text{ cm.}$$

The weight of mercury, Y_K, to be placed in the compensator tube K, shown in Fig. 5 and 6, is given by equation (16):

$$Y_K = \frac{\pi(R_K^2 - r_K^2) \cdot h^{t_1} \cdot (d^{t_1} - d^{t_5})\, c^{t_5}}{(c^{t_5} - c^{t_2})} = 1604.82 \text{ grams}$$

where $(d^t - d^t5)$ is the change in density between t_1 and t_5 for a 25° Baumé solution of black liquor.

The degree of compensation may be obtained by comparing the positive, pressure change due to the compensator, and the negative, pressure change due to sample density variation for any temperature t between t_1 and t_5. Equations (14) and (15) give this comparison:

$$\frac{Y_K(c^{t_5} - c^{t_2})}{\pi(R^2_K - r^2_K)c^{t_5}} = \frac{h^t \cdot (d^{t_1} - d^{t_5})}{D^{t_5}} \qquad (18)$$

Equating pressures, equation (18) becomes:

$$\frac{\pi(R^2_K - r^2_K)\, c^{t_5}}{Y_K \cdot (c^{t_5} - c^{t_2})} = h^{t_1}\,(d^{t_1} - d^{t_5}) \qquad (19)$$

TABLE I

° F.	$h^{t_1}(d^{t_1} - d^{t_5})$	$\frac{Y_K(c^{t_5} - c^{t_2})}{\pi(R_K^2 - r_K^2)c^{t_5}}$	Grams/cm.² Dev,	° Bé. Dev.	Uncompensated Deviation ° Bé.
		$15°$ Bé.$^{60/60}$			
60	0.00	0.00	0.00	0.00	0.00
80	—0.79	+1.20	+0.41	+0.25	—0.70
120	—2.95	+3.61	+0.66	+0.39	—2.00
140	—3.81	+4.81	+1.00	+0.59	—2.60
		$20°$ Bé.$^{60/60}$			
60	0.00	0.00	0.00	0.00	0.00
80	—1.13	+1.21	+0.08	+0.05	—0.70
120	—3.19	+3.61	+0.42	+0.25	—2.00
140	—4.28	+4.81	+0.53	+0.31	—2.70
		$25°$ Bé.$^{60/60}$			
60	0.00	0.00	0.00	0.000	0.00
80	—1.22	+1.21	—0.01	—0.009	—0.70
120	—3.62	+3.61	—0.01	—0.009	—2.10
140	—4.81	+4.81	0.00	0.000	—2.80
		$30°$ Bé.$^{60/60}$			
60	0.00	0.00	0.00	0.00	0.00
80	—1.33	+1.21	—0.12	—0.07	—0.70
120	—4.13	+3.61	—0.52	—0.31	—2.20
140	—5.59	+4.81	—0.78	—0.46	—3.00

By varying the temperature for a given Baumé at 60/60, equation (19) will result in a thermal, corrective, efficiency comparison. Table I is a numerical tabulation of such a procedure, and Fig. 7, lines AC, AE, AG, and AJ are the graphical representations.

The maximum compensation occurs at the value of Baumé 60/60 chosen for zero deviation. In this case 25° Bé$^{60/60}$. The minimum compensation occurs at the range extremities. This is again due to a change in slope of the temperature-Baumé curves with concentration.

The maximum deviation, shown in the line AJ for 15° Bé$^{60/60}$, is a distinctive step in correcting the measured value from (−2.60) to a (+0.59). This

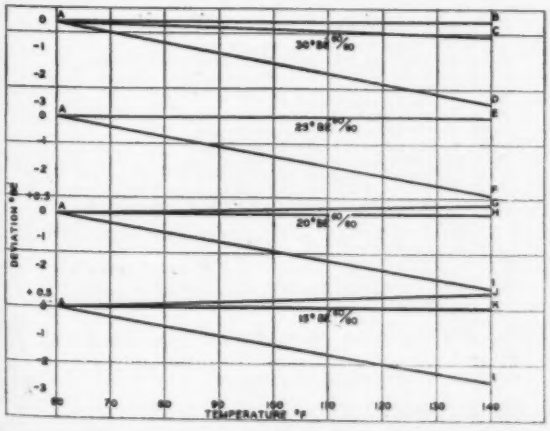

FIG. 7

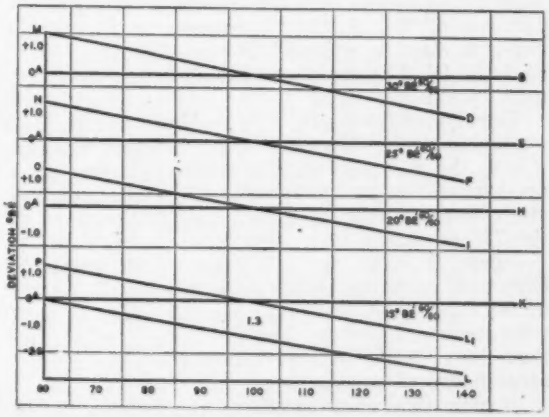

FIG. 8

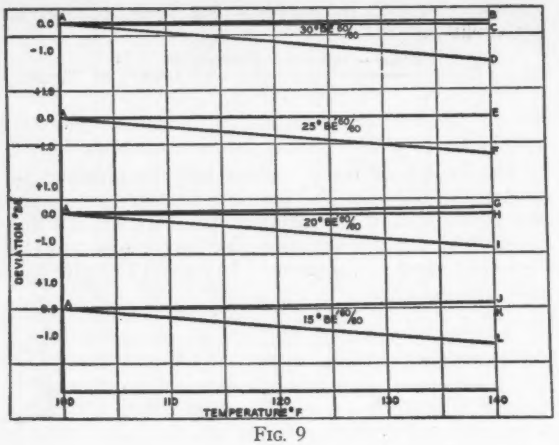

FIG. 9

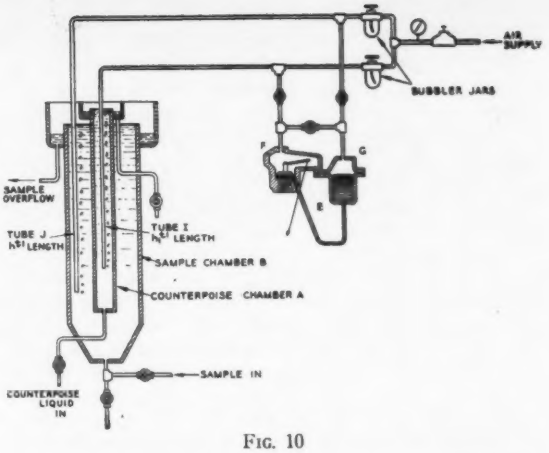

FIG. 10

amounts to a range of from 77.3 to 100% corrective efficiency as compared with 0% corrective efficiency.

In calculating density meters, an important factor to note is the selection of data such that it will correspond to the process characteristics. If the sample fluid temperature ranges between 100 and 140°F., there is no point in calculating a Y_K weight of mercury for a 60 to 140°F. correction. If the sample, fluid temperature varies from 100°F., this should be the choice of a value for t_1 and not 60°F. This latter statement applies particularly to uncompensated measurements. The 15° Bé. measurement in Fig. 8 will illustrate the importance of the above.

For example, a solution whose normal temperature is 100°F. is placed in a sample chamber, the bubbler tube of which was calculated for a temperature of 60°F. At a solution temperature of 100°F., the measurement will deviate from the 60/60 value of Baumé by 1.3°. Had t_1 been chosen at 100°F., the value of $h^t{}_1$ would have been greater since the value $(d_2{}^{t_1} - d_1{}^{t_1})$ in equation (6) is smaller. By this action a pressure has been added to the system in the amount equivalent to 1.3 units of a °Bé. At 100°F. the solution Baumé is the correct 60/60 value.

If the process temperature is chosen, carefully, the deviation will be divided over the Baumé range, even though the process temperature does vary slightly.

There is a mechanical correction that can be applied even though the process temperature does change. If a bubbler tube was computed for a 60°F. sample temperature, and the sample later rose to a value of 100°F., the pen-arm of the meter may be shifted to coincide with the correct 60/60 value. In the case of the 15° Bé$^{60/60}$ example in Fig. 8, the pen-arm may be adjusted to read 15° Bé. instead of 13.7° Bé. The net effect is to shift the line AL to a PL' position.

The compensator tube K is nothing more than an automatic device for continuously shifting the line AL to the PL position. The amount of pneumatic pressure correction is proportional to the temperature rise above the thermal datum and to the slope of the 25° Bé. line NF.

Figure 9 shows the effect of a more accurate choice of operating temperature, t_1=100°F. instead of 60°F., as well as a more narrow range of temperature compensation. The deviations are smaller than those shown in Fig. 7, which means a more accurate overall measurement.

In summation of these effects, the facts cannot be overemphasized that:

(a) The smallest range of compensation temperatures will result in maximum overall accuracy of the measured value of Baumé.

(b) The process temperatures, for the design of both compensated and noncompensated meter installations, should be selected only after a complete investigation has been made.

(c) The physical constants necessary for the design of any density installation are:

1. t_1 = lower limit of sample temperature as it exists in the process.
2. t_2/t_3 — t_2 is the temperature of the sample at which its density was measured and compared to the density of water at t_3.
3. $(t_4 - t_5)$ = ambient temperature range.
4. t_5 = upper limit of sample temperature change in the process.
5. $S_2{}^{t_2/t_3} - S_1{}^{t_2/t_3}$ = range in specific gravity to be measured.
6. If compensation is to be included, thermal data on the change in Baumé per °F. for the concentration range, $S_2{}^{t_2/t_3} - S_1{}^{t_2/t_3}$, will be required.
7. If compensation is to be included, the point in the range at which zero deviation will occur, must be specified.

Temperature Compensation of Density Measurements by the Use of Concentric Chambers

There has been some verbal discussion of the feasability of the temperature compensation of density measurements by constructing chambers A and B as a concentric heat exchanger (See Fig. 10) By this method, temperature changes in the sample chamber B will be reflected in the chamber A in an equal amount.

The quantitative relationship between the changes in density with temperature in chambers A and B will now be discussed.

The following symbols will be used:

t_1 = datum temperature of the sample fluid.
t_2 = temperature of the sample fluid above t_1.
h^{t_1} = length of tube J in the sample chamber B.
$h_1{}^{t_1}$ = length of tube I in the counterpoise chamber A.
a_1 = change in density per degree temperature for the fluid in sample chamber B.
a_2 = same as a_1 except for fluid in counterpoise chamber A.
ΔP_J = change in pressure in the J tube.
ΔP_I = change in pressure in the I tube.
$P_J{}^t$ = J tube pressure at temperature t.
$P_I{}^t$ = I tube pressure at temperature t.
d^t = density at temperature t of the sample fluid.
D^t = density at temperature t of the counterpoise fluid.

The effect of temperature variations may be more clearly visualized by the following:

The pressure in the J tube at t_1 is: $P_J{}^{t_1} = h^{t_1} \cdot d^{t_1}$
The pressure in the I tube at t_1 is: $P_I{}^{t_1} = h_1{}^{t_1} \cdot D^{t_1}$

The difference in pressure between the I and J tubes at t_1 is:

$$\Delta P^{t_1} = (h^{t_1} \cdot d^{t_1} - h_1{}^{t_1} \cdot D^{t_1}) \qquad (20)$$

The pressure in the J tube at t_2 is:

$P_J{}^{t_2} = h^{t_1} \cdot d^{t_2}$; but $d^{t_2} = [d^{t_1} - a_1 (t_2 - t_1)]$
Hence, $P_J{}^{t_2} = h^{t_1} [d^{t_1} - a_1 (t_2 - t_1)]$

The pressure in the I tube at t_5 is:

$$P_1^{t5} = h_1^{t1} \cdot D^{t5}; \text{ but } D^{t5} = [D^{t1} - a_2\ (t_5 - t_1)];$$
$$P_1^{t5} = h_1^{t1}\ [D^{t1} - a_1\ (t_5 - t_1)]$$

The difference in pressure between the I and J tubes at temperature t_5 is:

$$\Delta P^{t5} = h^{t1}\ [d^{t1} - a_1\ (t_5 - t_1)] - h_1^{t1}\ [D^{t1} - a_2\ (t_5 - t_1)] \quad (21)$$

If the apparatus, as shown in Fig. 10, is to compensate the measurement for temperature changes, the pressure difference before the temperature deviation from the base temperature t_1 should equal the pressure difference after the deviation. Thus from equations (20) and (21):

$$h^{t1} \cdot d^{t1} - h_1^{t1} \cdot D^{t1} = h^{t1}\ [d^{t1} - a_1\ (t_5 - t_1)] - h_1^{t1}\ [D^{t1} - a_2\ (t_5 - t_1)] \quad (22)$$
$$h^{t1} \cdot d^{t1} - h_1^{t1} \cdot D^{t1} = h^{t1} \cdot d^{t5} - h_1^{t1} \cdot D^{t5} \quad (22A)$$

Under what conditions can such an equality as the above be valid?

Equations (22) and (22A) show the basic relationship existing in a concentric chamber arrangement after a temperature change has occurred in the sample fluid.

The material in the counterpoise chamber A of density D^{t1} might be any liquid. However, if the slopes a_1 and a_2 are to have near, equal effects, the liquid in the chamber A should be of the same physical character as that in chamber B. The best and simplest way to arrive at this state of physical similarity is to use a fluid in the chamber A of like chemical character as the sample fluid.

In the following illustrations, D^{t1} will be varied between d_1^{t1} and d_2^{t1} and black liquor will be utilized as the counterpoise fluid.

$$(1)\ h^{t1} = \frac{RK}{(d_2^{t1} - d_1^{t1})}\ \text{(equation 5) and}\ h_1^{t1} = \frac{d_1^{t1} \cdot h^{t1}}{D^{t1}} \quad (23)$$
$$h^{t1} > h_1^{t1}$$

If d_1^{t1} changes with D^{t1} (see equation (22A)) on a temperature variation, the net difference in pressure at the manometer is less than if the change in D^{t1} is zero.

The change in pressure in the sample tube with no change in D^{t1} is:

$$h^{t1}\ (d^{t1} - d^{t5}) = \Delta P^{t1} - {}^{t5} \quad (24)$$

If D^{t1} changes with d^{t1}, then;

$$h^{t1} \cdot (d^{t1} - d^{t5}) - h_1^{t1}\ (D^{t1} - D^{t5}) = \Delta P^{t1} - {}^{t5} \quad (25)$$

That the change in pressure in equation (25) is smaller than that in equation 24 is apparent by inspection.

(a) Suppose the density D^{t1} of the counterpoise liquid is the same as the density of the sample liquid d^t correction. Equation (25) then becomes:

$$h^{t1}\ (d^{t1} - d^{t5}) - h_1^{t1}\ (d^{t1} - d^{t5}) = 0 \quad (26)$$

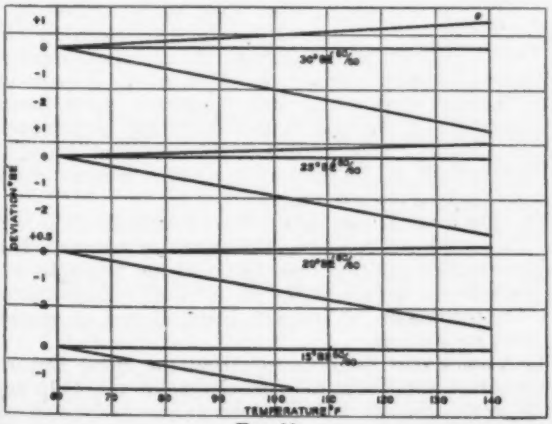

FIG. 11

Due to the difference between h^{t1} and h_1^{t1}, (26) is not a complete compensation.

If $h_1^{t1} = h^{t1}$, equation 26 becomes;

$$h^{t1}\ (d^{t1} - d^{t5}) - h^{t1}\ (d^{t1} - d^{t5}) = 0 \quad (27)$$

Equation (27) denotes a complete temperature compensation. However $h_1^{t1} = d_1^{t1} \cdot h^t / D^{t1}$. Therefore, h_1^{t1} can only be the same as h^{t1}, if $D^{t1} = d_1^{t1}$. Hence equation (27) becomes rather restricted in its application, that is;

$$h^{t1}\ (d^{t1} - d_1^{t5}) - h^{t1}\ (d_1^{t1} - d_1^{t5}) = 0 \quad (28)$$

Figure 11 shows the results of placing a 15° Bé.$^{60/60}$ solution of black liquor in the counterpoise chamber A and allowing the temperature to vary between 60 and 140°F., for a sample range of from 15° Bé.$^{60/60}$ to 30° Bé.$^{60/60}$.

It is apparent that perfect compensation exists only at the bottom of the range or 15° Bé.$^{60/60}$.

Due to an increase in the term $(d^{t1} - d^{t5})$ with concentration, the temperature compensation will be minimum at the top of the range. From a record standpoint, this quality is unfortunate, since the upper 50% of the chart is usually considered most important.

(b) If the pressure connections are reversed in Fig. 10, the measurement will have its scale, zero point at the top of the chart, if the meter body or manometer zero is:

$$h^{t1} \cdot d_2 = h_1^{t1} \cdot D^{t1};\ \text{or}\ h_1^{t1} = h_1^{t1} \cdot d_2 / D^{t1}$$

Figure 12 shows such an arrangement. The scale will be reversed, reading the lowest value of Baumé at the top and the highest at the bottom.

Under the above conditions, h_1^{t1} will be equal to h^{t1} if the density of the counterpoise liquid is equal to d_2^{t1}.

The result of such manipulation is perfect compensation for the top of the range. A revision of equation (28) therefore becomes:

$$h^{t1} \cdot (d_2^{t1} - d_2^{t5}) - h^{t1}\ (d_2^{t1} - d_2^{t5}) = \Delta P^{t1} - {}^{t5}$$

Figure 13 shows the graphical representation of the above. A 30° Bé.$^{60/60}$ solution of black liquor is placed in the compensator chamber A. The temperature is allowed to vary between 60 and 140°F., for a sample range of from 15° Bé.$^{60/60}$ to 30° Bé.$^{60/60}$.

Perfect compensation occurs at 30° Bé.$^{60/60}$.

Minimum compensation occurs at 15° Bé.$^{60/60}$.

(c) The case where h^{t1} is not equal to h_1^{t1}, and

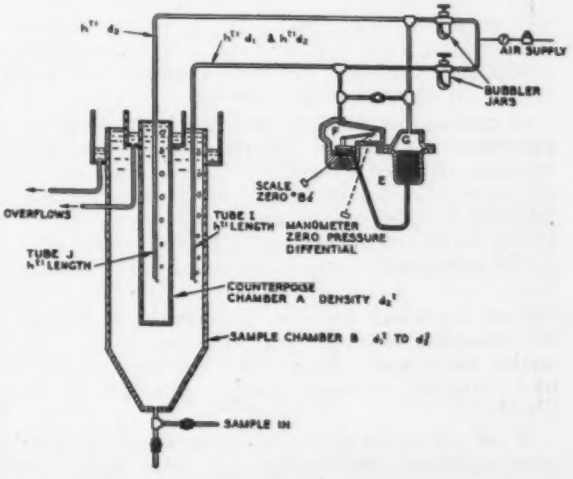

FIG. 12

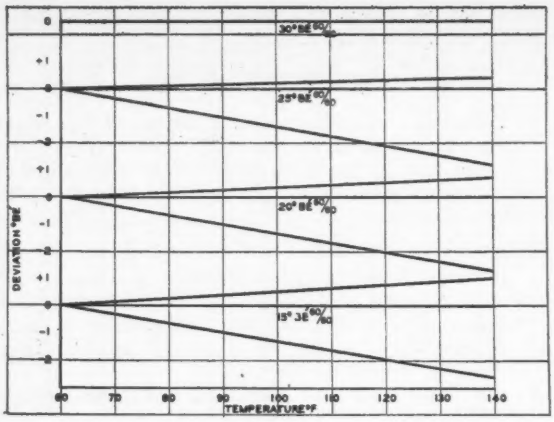

FIG. 13

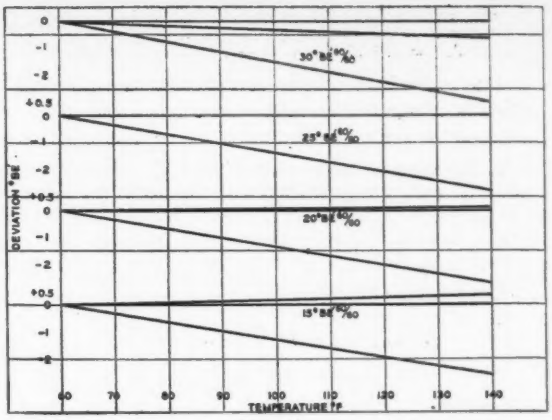

FIG. 14

the density of the counterpoise chamber D^{t1}, is greater than d_1^{t1} and less than d_2^{t1}.

An inspection of equation (25) will give the action of the above combination.

Maximum compensation for temperature changes will not occur at either extremity of the Baumé range. A maximum will occur when $h^{t1}\ (d^{t1}—d^{t5}) = h_1^{t1}\ (D^{t1}—D^{t5})$. The maximum compensation will occur at a point lower than D^{t1}, since h^{t1} is greater than h_1^{t1}.

The effect of such a procedure may be seen in Fig. 14. A 25° Bé.$^{60/60}$ solution of black liquor is placed in the counterpoise chamber A. The temperature is allowed to vary between 60 and 140°F., for a 15° Bé.$^{60/60}$ to 30° Bé.$^{60/60}$ sample range.

The antics of this compensation are extremely interesting:

(1) The maximum compensation of the density measurement occurs at a portion of the chart that is most usable, the point being regulated by an appropriate choice of the compensator fluid density.

(2) Perfect compensation occurs at some point below D^{t1}.

(3) There is a plus to a minus, deviation, inflection point, accounting for the perfect, compensation, density value.

The above analyses may seem merely academic in character. This is not entirely so. First, the material specifies the ability and limitations of this type of temperature compensation for density measurement.

The cases cited are practical even though perhaps cumbersome. They require a circulation system and condensing apparatus if temperatures are high enough to warrant such additions.

In case (a), if another restriction is placed on the equipment, its practical aspects become more pronounced. If water is used as a counterpoise medium, the value of d_1^{t1} must be that of the water at temperature t_1. The use of this liquid, therefore, restricts the measurement to a 0° Bé.$^{60/60}$ instead of a partial range above zero, as was used in the illustrations.

True, it presents the minimum compensation of all the examples; however, by a judicious choice of operating temperature, along with a restricted temperature variation, extremely good results will be obtained.

In all the above numerical illustrations, the temperature-Baumé relationships for black liquor are those as given in the TAPPI Data Sheet No. 58A (1940). It is noted on this sheet that the specific gravities are only approximate. If accuracy is to be achieved in compensated density measurement accurate relationships are necessary.

Of all the different methods described for temperature compensation of density measurements, the use of the external counterpoise and the sample compensator K, as shown in Fig. 5, is not only the most accurate over a wide temperature variation, but the most versatile as to its ability to react perfectly for any given point in the density range.

The nearest practical competitor is the concentric chamber using water as a counterpoise fluid and the necessity for scale widening in the higher density ranges.

Figures 7 and 11 show conclusively that the above statements are fact.

It is sincerely hoped that a revival of interest in the possibility of accurate concentration control will result from this material based on the proper use of the most rugged and most simple of all instruments, the differential manometer.

References

1. Handbook of Chemistry and Physics. 27th Edition—Chemical Rubber Pub. Co.
2. TAPPI Data Sheet No. 58A.

Scientific Instruments

The Chemical Publishing Company has just published "Scientific Instruments" by Herbert J. Cooper of South-West Essex Technical College in England (305 pp. 5½x8½). Each chapter is written by a different author. Five major fields are covered: 1. Optical instruments (cameras, microscopes, spectroscopes, photometers); 2. Measuring instruments (density, dimension, fluid, pressure, temperature, weight); 3. Navigation and surveying instruments; 4. Liquid testing (viscosity measurement); and 5. Miscellaneous (acoustics, hardness, vacuum tubes, and calculating machines).

The book is not an exhaustive treatise. It is well illustrated and contains little or no mathematics. It is devoted largely to a description of the principles underlying a large number of physical measurements. The authors are all connected with British companies and institutions.

Copies may be obtained from the Book Department of the Technical Association of the Pulp and Paper Industry, 122 East 42nd Street, New York 17, N. Y., at $6.00 per copy.

Paper and Paper Stock Imports At New York and Other Ports

NEW YORK IMPORTS

WEEK ENDING SEPTEMBER 28, 1946

SUMMARY

Newsprint ..... 1140 rolls, 1705 tons
Printing Paper .....1 ble., 49 cs.
Decalcomania Paper .. 10 drums, 54 cs.
Filter Paper .....25 cs.
Drawing Paper ..... 1 cs.
Tissue Paper ..... 5 cs.
Tracing Cloth ..... 21 cs.
Parchment Paper ..... 14 cs.
Carbon Paper ..... 1 cs.

NEWSPRINT

H. G. Craig Co., Donpaco, Donnacona, 360 rolls.
H. G. Craig Co., Newscarrier, Donnacona, 390 rolls.
H. G. Craig Co., A.C.D., Donnacona, 390 rolls.
News Syndicate Co., Kay, Thorold, Ont., 860 tons.
News Syndicate Co., Brian, Thorold, Ont., 845 tons.

PRINTING PAPER

Oxford University Press, Paul Bunyan, Liverpool, 49 cs.
H. Reeve Angel & Co., Inc., Paul Bunyan, Liverpool, 1 ble.

DECALCOMANIA PAPER

B. F. Drakenfeld & Co., Paul Bunyan, Liverpool, 39 cs., 10 drums (simplex & duplex).
B. F. Drakenfeld & Co., Fort Musquarro, Liverpool, 15 cs. (duplex).

FILTER PAPER

H. Reeve Angel & Co., Inc., Paul Bunyan, Liverpool, 25 cs.

DRAWING PAPER

H. Reeve Angel & Co., Inc., Paul Bunyan, Liverpool, 1 cs.

TISSUE PAPER

B. F. Drakenfeld & Co., Fort Musquarro, Liverpool, 5 cs. (pottery).

TRACING CLOTH

Taub Hummel & Schnall, Fort Musquarro, Liverpool, 1 cs.
Keuffel & Esser Co., American Forwarder, Manchester, 20 cs. (cotton).

PARCHMENT PAPER

Stevens Nelson Corp., Oglethorpe Victory, Antwerp, 7 cs.
F. C. Strype, Oglethorpe Victory, Antwerp, 7 cs.

CARBON PAPER

Mynol Chemical Co., American Forwarder, Manchester, 1 cs.

RAGS, BAGGINGS, ETC.,

Commercial Bank, Rattler, Melbourne, 14 bls. wool rags.
Bank of New South Wales, Onward, Sydney, 28 bls. old cotton rags.
A. W. Fenton Co., Inc., Paul Bunyan, Liverpool, 95 bls. mixed jeans.
National Vulcanized Fibre Co., Ogelthorpe Victory, Antwerp, 45 bls. old cotton rags.
Amtorg Trading Corp., Alexander Suvarov, Leningrad, 7941 bls. cotton linters; 1803 bls. cotton waste; 2103 bls. damaged linters.
Royal Manufacturing Co., American Forwarder, Manchester, 42 bls. cotton waste.
A. Bloch & Co., American Forwarder, Manchester, 114 bls. new cotton gabardine cuttings.
1st National Bank of Boston, American Forwarder, Manchester, 500 bls. cotton waste.
Castle & Overton, Inc., Amercan Forwarder, Belfast, 45 bls. new khaki cuttings.
A. W. Fenton Co., Inc., Fernglen, Alexandria, 145 bls. rags.
Padawer Corp., Fernglen, Alexandria, 140 bls. cotton waste.
E. J. Keller Co., Inc., Fernglen, Alexandria, 208 bls. old white cuttings; 202 bls. colored cottons; 215 bls. burlap strips.
Royal Manufacturing Co., African Prince, Santos, 59 bls. cotton picker waste; 30 bls. cotton thread waste.
Padawer Corp., African Prince, Rio de Janeiro, 62 bls. cotton waste.

CASEIN

Casein Co. of America, Division of The Borden Co., Mormacisle, Buenos Aires, 4781 bags ground lactic casein, 215,140 kilos.
Goldman Sachs & Co., African Prince, Buenos Aires, 2000 bags lactic casein.
F. H. Paul & Stein Bros., African Prince, Buenos Aires, 1000 bags lactic casein.

WOODPULP

Stora Kopparberg Corp., Bernhard Ingelsson, Skutskar, 2032 bls. dry woodpulp.
Gottesman & Co., Inc., Bernhard Ingelsson, Sundsvall, 450 bls. prime strong sulphite.
Cellulose Sales Co., Inc., Bernhard Ingelsson, Sundsvall, 726 bls. dry sulphite.
Bulkley Dunton Pulp Co., Bernhard Ingelsson, Sundsvall, 3468 bls. dry sulphite.

ALBANY IMPORTS

WEEK ENDING SEPTEMBER 28, 1946

J Andersen & Co., Bernhard Ingelsson, Sundsvall, 320 bls. air dry sulphite.
Cellulose Sales Co., Inc., Bernhard Ingelsson, Sundsvall 9315 bls. air dry sulphite; 2198 bls. kraft sulphate.

BOSTON IMPORTS

WEEK ENDING SEPTEMBER 28, 1946

H. Remis Co., African Prince, Buenos Aires, 197 bls. gluestock.
Cecil Kutz, African Prince, Santos, 134 bls. cotton waste.

PHILADELPHIA IMPORTS

WEEK ENDING SEPTEMBER 28, 1946

Textile & Paper Supply Corp., Mormacisle, Buenos Aires, 24 bls. cotton waste.

Foresters Meet at Camp Of Trees for Tomorrow

EAGLE RIVER, Wis.—A two-day meeting of the Wisconsin-Upper Michigan section of the Society of American Foresters was held here last week to discuss the care and management of immature timber stands and pine plantations.

The meeting, held at the Trees for Tomorrow, Inc., conservation camp, saw most of the program carried into the field, with study centered on techniques to provide a pattern for handling the area's forestry problems.

The 75 state, federal and private industry foresters visited the Nicolet National Forest and the Northern state forests to study and discuss aspen sprout control, spruce seed source study plots, DDT spraying of spittle bug areas, and thinning and pruning of hardwood sapling stands. The group also visited the 30-year-old Red Pine plantation at Star Lake.

Folke Becker, president of the Rhinelander Paper Company, Rhinelander, Wis., and the Trees for Tomorrow, Inc., who recently returned from Sweden and England, spoke on Sweden's forestry program.

Robertson Wins Approval For Training Program

MONTVILLE, Conn. — The Robertson Paper Box Company made public this week a letter received from William F. Patterson, Apprentice - Training Service, Department of Labor, Washington, D. C. The National Director stated that he believed the Apprenticeship Training Program formulated and adopted by the Robertson Paper Box Company in cooperation with the Norwich Paper Box Workers Union No. 494, International Printing Pressmen and Assistant's Union of North America and the Montville Local No. 512, International Brotherhood of Paper Makers, to be the first complete program of its kind in the nation. The letter further states that the program should prove of great value.

Packaging Engineers Elect Ware

CHICAGO—J. L. Ware, Sears, Roebuck & Company, has been elected treasurer of the Industrial Packaging Engineers Association of America.

Week's Record of Trends in The Pulp and Paper Market

Office of the PAPER TRADE JOURNAL,
Wednesday, October 2, 1946.

Demand for paper and paperboard continues undiminished in practically every grade. Sustained strong consumption requirements permit little inventory replenishment. Industrial consumers, printers and publishers, wholesale distributors, and retail stores continue to report inadequate supplies, particularly in such items as kraft wrapping, paper cups, tissues and fine papers, grocery bags, coated printing papers and boxed facial tissues. Upgrading of products continues with the result that many items have disappeared from certain markets or are very scarce. Most paper manufacturers maintain their quota or rationing systems to customers and there is little or no increase in the quantity offered.

A critical need for such paper mill products as rigid wall boards, plaster boards, roofing paper and insulating papers is being felt by builders. Shortages of draft and corrugated container papers and wrappers is holding up shipment of many building supplies. To meet these demands along with rising paper requirements of many other businesses a large expansion of the nation's paper industry is now under way, embracing both modernization and extension of existing plants and erection of new factories. The extent of the effort to increase supply of this vital commodity may be judged by the major projects on which the Rust Engineering Company now finds itself working in seven states.

The mill of Celotex Corp. of Marrero, La., is being expanded to turn out insulation boards, acoustical tile and related products for the nation's builders. Armstrong Cork Co. is constructing a large insulating board plant at Macon, Ga. The Kraft wrapping paper and board facilities of Container Corp. of America at Fernandina, Fla., are being enlarged. A new paper bag plant, which will mark the entrance of a successful Northern manufacturer into the Southern area is being designed for a site in Alabama. Recent additions also have been made to the Camp Manufacturing Co., at Franklin, Va., and West Virginia Pulp and Paper Co., at Covington, Va., where a variety of kraft paper is manufactured for later fabrication into products for housing, packaging, and industrial use.

The index of general business activity for the week ended September 21 fell to 132.9 from 134.5 in the previous week, compared with 121.7 for the corresponding week in 1945. The index of paperboard production fell to 154.6 from 158.5 in the previous week, compared with 138.4 for the corresponding week in 1945.

Paper production for the week ended September 21 was estimated at 105.8 per cent, compared with 105.1 for the preceding week, with 94.3 for the corresponding week in 1945, with 91.9 for 1944, with 92.2 for 1943, and with 87.2 for the corresponding week in 1942.

Paperboard production for the week ended September 21 was 100.0 per cent of capacity, compared with 101.0 per cent for the preceding week, with 93.0 for the corresponding week in 1945, with 96.0 for 1944, with 96.0 for 1943, and with 78.0 per cent for the corresponding week in 1942.

Wood Pulp

Foreign market wood pulp continues to hold the spotlight in so far as current and prospective production of domestic paper and paperboard is concerned. Now that most domestic pulp production is coming under the control of integrated paper and pulp or paperboard and pulp mills; the independent converters, especially fine, coarse and paperboard mills have become 50 to 100 per cent dependent on these imports. If imports do not soon show some improvement, the future may find most of these paper and board mills without wood pulp.

Prices on unbleached sulphate pulp made according to specifications for the manufacture of condenser paper are as follows: Canadian $84.50 f.o.b. shipping point with no freight allowance; European $94.50 per ton of 2,000 pounds air dry weight on dock Atlantic ports less $2.00 per ton freight allowance. These prices are applicable only to pulp mills authorized by OPA to sell on that basis.

Rags

New cotton cuttings remain in strong position at or near ceilings. All grades are relatively tight as paper mills increase output of rag content papers. Graders have all they can do to satisfy regular mill customers.

Old cotton rags are in fair supply, although offerings were freely absorbed. Old whites, roofing rags, blues and even foreign dark cuttings are in particularly good demand.

Old Rope and Bagging

Old rope market remains steady. Manila is still in short supply, with sisal continuing as the No. 1 substitute. Some low grade imported abaca fibre is reported to have brought 9c per pound. Manila, sisal and jute quotations are unchanged.

Market for old bagging is fairly active as mills seem eager to acquire supplies in addition to those they already have on order. Gunny is strong at $4.25 to $4.50; mill run bagging at $4.25 and mixed bagging at $4.00.

Waste Paper

Demand grows heavier for all grades while the baling wire shortage puts the waste paper industry in a serious predicament. Soft white shavings, fly leaf shavings and old ledger stock are needed to relieve the bleach pulp shortage.

Supplies are dropping off with collections below expectations. Most orders are being filled with little difficulty at top prices.

Hercules Names Rockwell Head Of Paper Makers Chemicals

WILMINGTON — Reginald Rockwell, assistant general manager of the Paper Makers Chemical Department of Hercules Powder Company since February, 1944, has been appointed general manager of the department, the company announced recently. He succeeds Ralph B. McKinney, general manager of the department since 1943, who died September 21.

Mr. Rockwell has been active in the manufacture of materials for the paper industry throughout most of his business career. He joined Hercules in 1922 and from then until 1941 he worked at the Brunswick, Ga., and Hattiesburg, Miss., naval stores plants of the company. Rosin made at these two plants is used in the manufacture of size for the paper industry.

A native of Nova Scotia, he attended Pictou Academy there, and graduated from Worcester Polytechnic Institute at Worcester, Mass., with a B.Sc. degree in electrical engineering.

Forestry Association Will Stage Forest Congress

WASHINGTON — Climaxing a year outstanding in American forest history, several hundred leading foresters, conservationists, industrial leaders and others will convene in Washington, October 9 to 11 for a national Forest Congress, the third of its kind sponsored by the American Forestry Association since 1882.

The association will present the results of a two-year survey of American forest resources, and a series of recommendations for a national forest policy which will be considered in "town meeting" sessions in October. Highlights of the recommendations include stronger effort to reduce forest damage by fire, insects and disease, stepping up education of forest land owners to bring about better forest management, extension of research to increase forest growth and to develop more complete utilization of wood.

B. C. Pulp Lays Foundations

VANCOUVER, B. C.—Foundations are now being laid at Woodfibre, B. C., for the new steam power plant for the B. C. Pulp & Paper Company Ltd. Date of completion of this project is uncertain, due to difficulty in securing delivery of machinery and equipment.

MISCELLANEOUS MARKETS

Office of the PAPER TRADE JOURNAL,
Wednesday, October 2, 1946.

BLANC FIXE—Demand continues active as raw materials remain tight. Pulp is currently quoted at $40 per ton, in barrels, car lots, at works; the powder is currently quoted at $60 per ton, car lots, f.o.b. works.

BLEACHING POWDER—Supplies are reported adequate to meet demand, with shipments temporarily delayed due to drum shortage. Quotations are unchanged. Prices on bleaching powder range from $2.50 to $3.10 per 100 pounds, in drums, car lots at works.

CASEIN—Current prices on processed acid-precipitated casein are reported at 48 to 49 cents per pounds for domestic grades, and 45 cents per pound for Argentine grades; f.o.b. shipping point, with quantity not specified at the present time.

CAUSTIC SODA—Supplies tightest ever as market remains critical. Sheet steel shortage creates drum and container scarcity. Cutback production further reduces stock. Solid caustic soda is quoted at $2.30 per 100 pounds; flaked and ground is quoted at $2.70 to $2.95 per 100 pounds. All prices car lots.

CHINA CLAY—Supplies are becoming tighter as demand continues to increase. Quotations remain unchanged. Domestic filler clay is currently quoted at from $8.50 to $9 per ton; coating clay is quoted at from $12 to $22 per ton, at mine. Imported clay is quoted at from $22 to $25 per long ton, ship side. All prices quoted in car lots.

CHLORINE — Demand continues to exceed output, market tight, stocks low. Tank cars and steel container situation slow shipments. Quotations unchanged. Chlorine is currently quoted at $2.00 to $2.25 per 100 pounds, in single unit tank cars, f.o.b. works.

ROSIN—Gum rosin in drums, per 100 pounds net, in yard, New York. B, $8.30; D, $8.30; E, $8.83; F, G, H, I, K, M, N, WG, and WW, $9.30. All prices in car lots, rosin in bags, 5c less.

SALT CAKE—Demand increasing with supplies showing some improvement. Prices remain unchanged. Domestic salt cake is quoted at $15 per ton, in bulk. Chrome salt cake is quoted at $16 per ton. All prices in car lots, f.o.b. shipping point.

SODA ASH—Supplies continue short, demand active, previous orders filled. Quotations continue unchanged. Current prices, car lots, per 100 pounds, are as follows: in bulk, $.95; in paper bags, $1.05; and in barrels, $1.35. Current boxcar shortage temporarily delays shipments.

STARCH — Supplies inadequate to meet demand. Previous orders filled. Starch prices continue unchanged. The pearl grade is quoted at $5.87 per 100 pounds; powdered starch at $6.02 per 100 pounds; both prices in bags, car lots, f.o.b. Chicago.

SULPHATE OF ALUMINA—Demand active, supply fair. Quotations continue unchanged. The commercial grades are quoted at from $1.15 to $1.20 per 100 pounds, in bags, car lots, f.o.b. works. The iron free is currently quoted at $1.75 to $2.00 per 100 pounds, in bags, at works.

SULPHUR—Strong seasonal demand is reported with stocks plentiful. Annual contracts are quoted at $16 per long ton, f.o.b. mines; the price f.o.b. at Gulf Ports is $17.50 per long ton. Prices in car lots. Some shipments temporarily delayed.

TALC—Domestic and French grades are moving in fair volume with prices steady. Domestic grades are currently quoted at from $16 to $30 per ton at mines; Canadian at $24 to $30 per ton. All prices on car lots.

MARKET QUOTATIONS

All market quotations, excepting those otherwise designated as official OPA maximum prices, are based on the manufacturers' price level as of October 1-15, 1941; maximum wholesale prices are based on the merchants' maximum prices for stipulated quantities at a quoted price to all customers of a like class, as shown by the merchant's sales records of goods delivered during March, 1942. A merchant's price list in effect in March, 1942, showing quotations of actual shipments, will establish the current maximum prices.

Paper

(Delivered New York)

Standard News, per ton—

Roll, contract	$74.00	@	—
Sheets	75.00	@	—

Kraft—per cwt.—Carload Quantities
Zone A, Delivered

Superstandard Wrapping	*$5.25	@	—
No. 1 Wrapping	*5.00	"	—
Standard Wrapping	*4.75	"	—
Standard bag	*4.75	"	—

* Prices for Standard Wrapping are for 40 lb. base weight; for Standard Bag for 30 lb base weight.

Tissues—Per Ream—Carlots

White No. 1	1.12½	"	—
White No. 1 M. G.	1.10	"	—
White No. 1½	1.00	"	—
White No. 2	.90	"	—
Anti-Tarnish M.F.	1.20	"	—
Colored	—	"	—
Kraft	.95	"	—
Manila	.90	"	—

Toilet—1 M. Sheets—Per Case

Unbleached	4.25	"	—
Bleached	5.70	"	—
Unbl. Toilet, 1 M.	4.16	"	—
Bleached Toilet	5.70	"	—

Paper Towels, Per Case—

Unbleached, Jr.	2.20	"	—
Bleached, Jr.	3.20	"	—

Manila—per cwt.—C. l. f. a.

No. 1 Jute	11.25	@	—
No. 1 Manila 35 lb.	6.00	"	7.00

Boards, per ton—

News	*58.00	@	—
Chip	*58.00	@	—
Sgl. Mla. Ll. Chip	*67.00	@	—
White Ust. Coated	*81.00	@	—
Kraft Liners 50 lb.	*74.00	"	—
Binders Boards	84.00	"	116.00

* OPA Base Prices per 10 tons. Less than 10 tons but over 3 tons, add $2.50; three tons or less, add $5; regular 35-39 basis, add $5; basis 40-49, add $2.50; basis 91-100, add $2.50; basis 101-120, add $5.

The following are representative of distributors' resale prices, all deliveries in Zone 1:

Rag Content Bonds and Ledgers—White, Assorted Items

	Bonds	Ledgers
100% Rag Ext. No. 1	$39.75@$46.75	$40.90@$48.00
100% Rag	32.85 " 38.50	34.00 " 40.00
85% Rag	.... "	30.55 " 38.75
75% Rag	24.30 " 28.50	24.45 " 30.00
65% Rag	.... "	.... " ....
50% Rag	20.05 " 24.50	21.25 " 25.75
25% Rag	17.85 " 21.75	19.00 " 23.25

Colors at $1.00 cwt. extra.

Sulphite Bonds and Ledgers.. White, Assorted Items

	Bonds	Ledgers
No. 1	$12.00@$14.50	$13.15@$16.00
No. 2	11.25 " 13.75	12.25 " 15.00
No. 3	.... "	.... " ....
No. 4	10.60 " 13.00	11.75 " 14.25

Colors $1.00 cwt. extra.

Free Sheet Book Papers—White, Cased Paper

No. 1 Glossy Coated	$14.70@$16.75	
No. 2 Glossy Coated	13.75 "	15.50
No. 3 Glossy Coated	13.20 "	16.00
No. 4 Glossy Coated	12.80 "	14.90
No. 1 Antique (Watermarked)	11.35 "	12.75
No. 2 Offset	10.65 "	12.25
A Grade E. F.	10.60 "	12.00
A Grade S. & S. C.	11.00 "	12.50
B Grade E. F.	10.30 "	11.75
B Grade S. C.	10.70 "	12.25
C Grade E. F.	10.00 "	11.50
C Grade S. C.	10.40 "	12.00
D Grade E. F.	9.70 "	11.00
D Grade S. & S. C.	10.10 "	11.50

Ivory & India at $.50 cwt. extra.

Wood Pulp

OPA Maximum Prices and Canadian Manufacturers' Prices, Less Freight Not Exceeding OPA Allowances.

Bl. Softwood Sulphite	$103.50
Unbl. Softwood Sulphite	90.00
Bl. Hardwood Sulphite	100.50
Unbl. Hardwood Sulphite	87.50
N. Bleached Sulphate	103.50
S. Bleached Sulphate	97.00
N. Semi-Bleached Sulphate	98.00
S. Semi-Bleached Sulphate	91.50
N. Unbl. Sulphate	83.50
S. Unbl. Sulphate	76.50
Bleached Soda	93.50
Unbleached Soda	88.00
Groundwood	64.00
Ground—Machine Dried	67.00
Sulphite Screenings	50.00
Sulphate Screenings	44.00
Groundwood Screenings	37.50
N. Unbl. Sulphate Sideruns	83.50
S. Unbl. Sulphate Sideruns	76.50
Standard Newsprint Sideruns	64.00

Transportation Allowances Applying to Producers of Wet Wood Pulp.

	Below 50% Air Dry Weight
Northeast	$12.50
Lake Central	12.50
Southern	15.00
West Coast (in area)	9.50
West Coast (out area)	15.50

	50%-80% Air Dry Weight
Northeast	$10.50
Lake Central	10.50
Southern	13.00
West Coast (in area)	8.50
West Coast (out area)	14.50

Applying to Producers of Dry Wood Pulp.

	Above 80% Air Dry Weight
Northeast	$7.50
Lake Central	7.50
Southern	10.00
West Coast (in area)	6.50
West Coast (out area)	12.50

Should freight charges actually exceed these allowances, the difference may be added to the maximum prices

Domestic Rags

New Rags
(Nominal Prices Delivered at Mill + 5% Brokerage)

Shirt Cuttings—

New White, No. 1	7.25 @	Nominal
Silesias No. 1	5.75 "	"
New Unbleached	7.50 "	"
Blue Overall	5.50 "	"
Fancy	3.50 "	"
Washables	3.00 "	"
Bleached Khaki Cutting	4.25 "	"
Unbleached Khaki Cuttings	3.50 "	"

Old Rags

White, No. 1—			
Repacked	3.80	●	Nominal
Miscellaneous	3.20	"	"
White, No. 2—			
Repacked	2.90	"	"
Miscellaneous	2.65	"	"
Thirds and Blues—			
Repacked	2.20	"	"
Miscellaneous	1.30	"	"
Roofing Rags—			
No. 1	1.55	"	"
No. 2	1.45	"	"
No. 3 (bagging)	1.35	"	"
No. 4	1.35	"	"
No. 5A	1.35	"	"
Old Manila Rope	5.75	"	"

Foreign Rags

(All Prices Nominal)

New Rags

New Dark Cuttings	6.00	●	Nominal
New Mixed Cuttings	6.50	"	"
New Light Silesias	5.75	"	"
Light Flannelettes	5.75	"	"
New White Cuttings	12.00-14.00		
New Light Oxfords			Nominal
New Light Prints	8.00-10.00		

Old Rags

No. 1 White Linens	8.50	●	Nominal
No. 2 White Linens	7.50	"	"
No. 3 White Linens			Nominal
No. 4 White Linens	3.25	●	Nominal
No. 1 White Cotton	4.75	"	"
No. 2 White Cotton	3.75	"	"
No. 3 White Cotton	3.00	"	"
No. 4 White Cotton	2.20	"	"
Extra Light Prints	2.40	"	"
Ord. Light Prints	5.50	"	"
Med. Light Prints	4.75	"	"
Dutch Blue Cottons			Nominal
French Blue Linens			Nominal
Checks and Blues	4.00	"	"
Linsey Garments	4.00	"	"
Dark Cottons	3.60	"	"
Old Shopperies	3.35	"	"
New Shopperies	3.50	"	"
French Blues			Nominal

BAGGING

(Prices to Mill, f.o.b. N. Y.)

Gunny No. 1—			
Foreign	4.00	●	Nominal
Domestic	3.30	"	"
Wool Tares, light	4.00-4.75		
Wool Tares, heavy	4.50	●	Nominal
Bright Bagging	3.50	"	"
Manila Rope—			
Foreign			Nominal
Domestic	5.75	●	Nominal
Jute Strings	4.50	"	"
No. 1 Sisal Strings	3.00	"	"
Mixed Strings	1.50	"	"

Waste Paper

Nominal Prices to Mills

(Dollars Per Ton)

F.o.b. New York, Baled

No. 1 Hard White Envelope Cuts, one cut	$67.50	●	—
No. 1 Hard White Envelope Cuts	62.50	"	—
No. 1 Hard White Shavings, unruled	57.50	"	—
No. 1 Hard White Shavings, ruled	50.00	"	—
Soft White Shavings, one cut	57.50	"	—
No. 1 Soft White Shavings	50.00	"	—
Soft White Shavings, Misc.	43.00	"	—
No. 1 Fly Leaf Shavings	33.50	"	—
No. 2 Fly Leaf Shavings	22.50	"	—
No. 1 Groundwood Fly Leaf Shavings	25.00	"	—
No. 2 Mixed Groundwood Fly Leaf Shavings	18.50	"	—
Mixed Colored Shavings	15.50	"	—
Mixed Groundwood Colored Shavings	18.00	"	—
Overissue Magazines	33.50	"	—
No. 1 Heavy Books & Magazines	38.50	"	—
Mixed Books	22.00	"	—
No. 1 White Ledger	46.00	"	—
No. 2 Mixed Ledger, colored	40.00	"	—
New Manila Envelope Cuttings, one cut	57.50	"	—
New Manila Envelope Cuttings	53.00	"	—
Extra Manilas	39.00	"	—
Mixed Kraft, Env. & Bag Cuttings	55.00	"	—
Kraft Envelope Cuttings	65.00	"	—
Triple Sorted, No. 1 Brown Soft Kraft	50.00	"	—
New 100% Kraft Corrugated Cuttings	45.00	"	—
No. 1 Assorted Old Kraft	35.00	"	—
New Jute Corrugated Cuttings	18.50	"	—
Old 100% Kraft Corrugated Containers	35.00	"	—
Box Board Cuttings	14.50	"	—
White Blank News	33.00	"	—
Overissue News	22.00	"	—
No. 1 News	20.00	"	—
No. 1 Mixed Paper	19.00	"	—
Old Corrugated	28.00	"	—
Mill Wrappers	22.00	"	—

Twines

All Prices Nominal

(F. o. b. Mill)

(Soft Fiber)

Coarse Polished—			
India	.26	●	—
White Hemp	.26	"	—
Fine Polished—			
Fine India	.31	"	—
Unpolished—			
Box	.20¼	"	—
Paper Makers	.20	"	—
Tube Rope	.22	"	—
Wall Paper	.23½	"	—
Wrapping	.26	"	—
Soft Fiber Rope	.22	"	—
Cotton	.28	"	—
(Hard Fiber)			
Medium Java	.23	"	—
Mex. Sisal	.21	"	—
Manila	.33	"	—

PHILADELPHIA

Domestic Rags (New)

(Price to Mill)

Shirt Cuttings—	
New White No. 1	.07¾
New White No. 2	.05¾
Light Silesias	.05¾
Black Silesias, soft	.03¾
New Unbleached	.07½
Washable Prints	.04¾
Washable No. 1	.03
Blue Overall	.05½
Cottons—According to grades—	
Washable Shredding	.01¾
Fancy Percales	.04¾
New Black Soft	.03¾
Khaki Cuttings—	
Unbleachable Cotton Cuttings	.03½
Bleachable Cotton Cuttings	.04¼
Men's Corduroy	.03½
Ladies' Corduroy	.03
Cottonades	.03¾

Domestic Rags (Old)

White No. 1—Repacked	3.80	●	—
Miscellaneous No. 1	3.20	"	—
Miscellaneous No. 2	2.65	"	—
White No. 2—Repacked	2.90	"	—
Thirds and Blues—			
Miscellaneous	1.80	"	—
Repacked	2.20	"	—
Black Stockings—			
(Export)	Nominal		
Roofing Stock—			
Foreign No. 1	Nominal		
Domestic No. 1	1.55	"	—
Domestic No. 2	1.45	"	—
Roofing Bagging	1.35	"	—
Old Manila Rope	5.75	"	—

Bagging

(F. o. b. Phila.)

Gunny No. 1—			
Foreign	Nominal		
Domestic	3.00	●	3.50
No. 1 Clean Bright—			
Sisal Strings	.04	"	—
No. 2 Clean Bright—			
Sisal Strings	.03	"	—
Sisal Jute	.02½	"	.02¾
Scrap—			
No. 1	3.25	"	3.50
No. 2	1.75	"	1.80
Wool Tares, heavy	4.00	"	4.25
No. 1 New Light Burlap	3.00	"	4.00
New Burlap Cuttings	3.75	"	4.00

Old Papers

(F. o. b. Phila.)

OPA Maximum Prices, Baled

No. 1 Hard White Envelope Cuts, one cut	3.37½	●	—
No. 1 Hard White Shavings, unruled	2.87½	"	—
Soft White Shavings, one cut	2.50	"	—
White Blank News	1.65	"	—
Soft White Shavings, Misc.	2.13	"	—
No. 1 White Ledger	2.30	"	—
No. 2 Ledger, colored	2.00	"	—
No. 1 Heavy Books & Magazines	1.92½	"	—
Overissue Magazines	1.67½	"	—
New Manila Envelope Cuttings	2.65	"	—
No. 1 Assorted Old Kraft	1.75	"	—
No. 1 Mixed Paper	.95	"	—
Box Board Cuttings	.72½	"	—
Kraft Corrugated Cuttings	2.25	"	—
Old Corrugated Containers	1.40	"	—
Overissue News	1.00	"	—
No. 1 News	1.00	"	—

BOSTON

Old Papers

(F. o. b. Boston)

OPA Maximum Prices, Baled

No. 1 Hard White Shavings, unruled	2.87½	●	—
No. 1 Hard White Shavings, ruled	2.50	"	—
Soft White Shavings, Misc.	2.15	"	—
No. 1 Fly Leaf Shavings	1.67½	"	—
No. 2 Fly Leaf Shavings	1.12½	"	—
No. 1 Groundwood Fly Leaf Shavings	1.25	"	—
No. 2 Groundwood Fly Leaf Shavings	.90	"	—
Mixed Colored Shavings	.75	"	—
New Manila Envelope Cuts, one cut	2.87½	"	—
Hard White Envelope Cuts, one cut	3.37½	"	—
Triple Sorted No. 1 Brown Soft Kraft	2.50	"	—
Mixed Kraft Env. & Bag Cuttings	2.75	"	—
Kraft Envelope Cuttings	3.25	"	—
No. 1 Heavy Books & Magazines	1.92½	"	—
New Manila Envelope Cuts, one cut	2.87½	"	—
New Manila Envelope Cuttings	2.65	"	—
White and Colored Tabulating Cards	2.25	"	—
Ground Wood Tabulating Cards	1.35	"	—
White Blank News	1.65	"	—
No. 1 Assorted Old Kraft	1.75	"	—
No. 1 Mixed Paper	.95	"	—
Overissue News	1.10	"	—
Box Board Cuttings	.72½	"	—
New Corrugated Cuttings, Kraft	2.25	"	—
Old 100% Kraft Corrugated Containers	1.75	"	—
Old Corrugated Containers	1.40	"	—
Jute Corrugated Cuttings	1.07½	"	—

Bagging

(F. o. b. Boston)

Gunny Bagging—			
Foreign	(nominal)		
Domestic	2.75	●	2.90
Sisal Rope No. 1	*4.75	"	—
Sisal Rope No. 2	* —	"	4.00
Mixed Rope	1.60	"	—
Transmission Rope—			
Foreign	(nominal)		
Domestic	2.75	"	3.00
Manila Rope—			
Foreign	(nominal)		
Domestic	5.75	"	—
Soft Jute Rope	4.50	"	5.00
Jute Carpet Threads	3.00	"	3.50
Bleachery Burlap	8.50	"	9.00
Scrap Burlap—			
Foreign	(nominal)		
Domestic	3.00	"	3.25
South America	—	"	3.25
Wool Tares—			
Foreign	(nominal)		
Domestic	4.25	"	—
Aust. Wool Pouches	—	"	3.40
New Zealand Wool Pouches	—	"	3.50
New Burlap Cuttings	4.75	"	5.00
Heavy Baling Bagging	4.00	"	4.25
Paper Mill Bagging	2.50	"	3.00
No. 2 Roofing Bagging	1.35	"	—

* OPA Maximum Prices.

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—		
New Light Prints	.04½	● .04½
Fancy Percales	.04¼	" .04¼
New White No. 1	.06¾	" .07
New Light Flannelettes	.05½	" .06
Canton Flannels, Bleached	.06	" .06½
Underwear Cutters, Bleached	.06¾	" .06¾
Underwear Cutters, Unbleached	.05¾	" .06
Silesias No. 1	.06	" .06½
New Black Silesias	.03	" .03½
Red Cotton Cuttings	.03½	" .04
Soft Unbleached	.06½	" .06½
Blue Cheviots	.05½	" .06
Fancy	.02¾	" —
Washable	.02¾	" —
Khaki Cuttings	.02¾	" .03
O. D. Khaki	.03½	" .03½
Corduroy	.03¼	" .03¼
New Canvas	.06¼	" .06½
B. V. D. Cuttings	.06¼	" .06¾

Domestic Rags (Old)

(F. o. b. Boston)

White No. 1—			
Repacked	3.80	●	—
Miscellaneous	3.20	"	—
White No. 2—			
Miscellaneous	2.65	"	—
Twos and Blues, Repacked	2.20	"	—
Old Blue Overalls	2.25	"	2.50
Thirds and Blues, Repacked	2.20	"	—
Miscellaneous	1.80	"	—
Black Stockings	3.50	"	4.00
Roofing Stock—			
No. 1	1.55	"	—
No. 2	1.45	"	—
No. 3	1.35	"	—
No. 4	1.35	"	—
No. 5, Quality A	1.35	"	—
Quality B	1.20	"	—
Quality C	.95	"	—
Old Manila Rope	5.75	"	—

* OPA Maximum Prices.

Foreign Rags

(F. o. b. Boston)

Canvas	(nominal)
Dark Cottons	(nominal)
Dutch Blues	(nominal)
New Checks and Blues	(nominal)
Old Fustians	(nominal)
Old Linsey Garments	(nominal)
New Silesias	(nominal)

CHICAGO

Waste Paper

(F. o. b. Chicago)

OPA Maximum Prices, Baled

Shavings—			
No. 1 Hard White Envelope Cuts, one cut	3.37½	●	—
No. 1 Hard White Shavings, unruled	2.87½	"	—
No. 1 Soft White Shavings	2.50	"	—
No. 1 White Ledger	2.30	"	—
No. 1 Heavy Books & Magazines	1.92½	"	—
White Blank News	1.65	"	—
Mixed Kraft Env. & Bag Cuttings	2.75	"	—
No. 1 Assorted Old Kraft	1.75	"	—
Overissue News	1.10	"	—
No. 1 News	1.00	"	—
No. 1 Mixed Paper	.95	"	—
No. 1 Roofing Rags	1.35	"	—
No. 1 Roofing Bags	1.45	"	—

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J. E. SIRRINE & CO. Greenville, South Carolina *Engineers* Established 1902
PAPER & PULP MILLS • WASTE DISPOSAL • TEXTILE MILLS •
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Represented in U. S. and Canada by GEIGY COMPANY INC. 89-91 Barclay Street, New York, New York
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THE MAYER MACHINE COMPANY, INC.
Manufacturers of
Paper Coating Machines
1155 Scottsville Road, Rochester 11, N. Y.
Waxing & Oiling, Carbon, Laboratory, Flat Ream Converting and Measuring and Roadmarking.

Appleton Wires are Good wires
APPLETON WIRE WORKS, INC. APPLETON, WIS.

NEW 44" NATIONAL AUTOMATIC CUTTERS.
Compact—Accurate—Sturdy
Completely equipped
THOMAS W. HALL COMPANY, Inc.
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POSITIVE
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High Speed Disc Refiner
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ADVISORY AND CONSULTING SERVICE FOR THE PAPER CONVERTING INDUSTRY.
COATING ON PAPER MACHINES
COATING IN GENERAL
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All forms of paper converting
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THE CORROSION RESISTANT ALLOY
CAST • ROLLED • FABRICATED
for all equipment exposed to corrosion by sulphite acids
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INDUSTRIAL **TYCOL** OILS-GREASES
A COMPLETE LINE
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HELP WANTED

CHIEF ENGINEER

To assume complete charge new power plant; progressive paperboard mill. Address Box No. 46-626 care Paper Trade Journal. O-3

PROCESS ENGINEER

Wanted

With wide experience in pulp and paper making processes. Must be able to develop flow diagrams and specify related equipment. Excellent opportunity for the right man. Please furnish complete experience record.
Address Box 46-261 care Paper Trade Journal. TF

SALARIED POSITIONS

$2,800-$25,000. This thoroughly organized confidential service of 36 years' recognized standing and reputation carries on preliminary negotiations for supervisory, technical and executive positions of the calibre indicated. Retaining fee protected by refund provision. Identity covered and present position protected. Send only name and address for details.

R. W. BIXBY, INC.
117 Dun Bldg., Buffalo 2, N. Y.

WANTED

Sales engineer to represent long established eastern paper mill machinery manufacturer, must have thorough knowledge of paper mill equipment also free to travel; would consider former paper mill superintendent or maintenance engineer. Reply by letter, specifying age, experience, qualifications, how soon available, also salary expected. Address Box 46-685 care Paper Trade Journal. O-17

ENGINEER-DRAFTSMAN

For Paper Mill in Massachusetts. Young man 25-30 years of age. Good appearance and personality. Preferably with some paper mill experience. Salary $225.00-$250.00 per month. Address Box No. 46-676 care Paper Trade Journal. O-24

GUMMING SUPERVISOR—Wanted by large well established paper converter. Should have practical experience in production of gummed paper and cloth tapes and gummed specialty papers. Give full details of qualifications and experience. Address Box 46-612 care Paper Trade Journal. D-19

PERU, SOUTH AMERICA—Opening for experienced Tour Boss under 50 to work on cylinder and fourdrinier machines in a board and tissue mill; three year agreement; transportation and modern homes provided for employees and families; special school for younger children; moderate climate. Address Box 46-659 care Paper Trade Journal. O-10

WANTED—TOUR BOSS for prominent New England Mill with two board machines, manufacturing high grade folding box board. Permanent position. Write, giving age, qualifications and salary expected in first letter. Address Box 46-521 care Paper Trade Journal. TF

HELP WANTED

CHARLES P. RAYMOND SERVICE, Inc.
294 Washington St., Boston, Mass.
Specializing in Paper Mill Personnel
Positions Now Open

Tour boss, cylinder and fourdrinier, board and tissue mills in So. America
Designer paper mill machinery
Woodlands Manager
Technical Director tissue mill
Draftsmen and designers
Master mechanic and assistant master mechanics for Northern mills
Graduate mechanical engineer for Ohio
Cylinder machine tender on tissues
Plant engineers and many others

We invite correspondence (strictly confidential) with paper and pulp mill executives seeking new positions and with employers seeking new personnel. O-3

MILLWRIGHTS and Industrial Pipe Fitters. Good wages, permanent position. Preference for men with Paper Mill experience. Excellent living accommodation. Apply to Spruce Falls Power and Paper Company, Employment Office, Kapuskasing, Ontario. O-3

COATING MILL plant chemist required—Mill near Toronto, Canada. Address Box 46-689 care Paper Trade Journal. O-3

SITUATIONS WANTED

ENGINEER-OPERATOR

With wide experience in stock preparations, mill design and operation for specialty papers and for board.

Can select most efficient equipment and supervise layout to make high grade wall board from many kinds of wood.

Box 46-672 care Paper Trade Journal. O-31

ENGINEER will be available for new assignment November first on consulting or temporary employment basis. Broad experience in felt, board, asphalt roofings and allied products. New construction, modernization, operation and economic problems. Will prepare Studies, reports, plans, specifications and supervise entire projects. Address Box 46-644 care Paper Trade Journal. O-10

SUPERINTENDENT—30 years experience in light weight crepe tissues and towels. Capable of production and all maintenance on cylinder, Yankee pickups and Fourdrinier machines. References furnished. Address Box 46-619 care Paper Trade Journal. O-10

PURCHASING AGENT—Fifteen years Pulp and Paper Mill, also woods operation purchasing experience and prior engineering education and experience, desires make change to position offering opportunities and salary commensurate with abilities. Address Box 46-648 care Paper Trade Journal. O-3

MILL REPRESENTATIVE covering the jobbing and direct trade for the past 15 years from Pennsylvania through to the Carolinas, now desires to operate over the same territories with 2 or 3 non-conflicting lines. What have you to offer? Address Box 46-412 care Paper Trade Journal. TF

INSTRUMENT ENGINEER desires position as staff instrument engineer with a large pulp and paper mill. Graduate engineer with eight years experience in process instrumentation. Two years directly connected with the pulp and paper industry. Address Box 46-567 care Paper Trade Journal. O-3

SITUATIONS WANTED

CHEMIST—with six years experience desires position of responsibility in Fine Paper Mill. Experienced in Manufacture of Cigarette, Carbon, Bond Banknote papers. Supervision of Cooking, Bleaching of Flax, Hemp and Cotton. Accommodations for family essential. Address Box 46-673 care Paper Trade Journal. O-24

FOURDRINIER MACHINE TENDER desires position with promotion possibilities. Young, 34, ten years experience all grades, technical training, references. What have you to offer? Address Box 46-674 care Paper Trade Journal. O-17

POSITION AS SUPERINTENDENT of finishing wanted. Man under 45 years of age with 20 years experience in the processing and finishing of both high and low grade Bonds, Weddings, Writings, Book, Cover and specialty papers. Experienced in the care and operation of nearly all types of paper finishing machinery and equipment. At present employed but desires a position with more responsibility and opportunity. Give particulars in first letter. Address Box 46-675 care Paper Trade Journal. O-3

MECHANICAL ENGINEER—20 years experience, plant design, process development, erection, cooperative reliable character, excellent references, now employed, seeks position offering better opportunities. Address Box 46-681 care Paper Trade Journal. O-17

FINISHING DEPT. or Converting Mgr., Sheeting, Cutting, Rewinding, Packing, Printing, Bond, Kraft, Specialties, Tissues, Waxed, Shipping, Scheduling. Years practical experience. Address Box 46-683 care Paper Trade Journal. O-10

EXECUTIVE POSITION by mature, technically trained man, experienced in manufacturing, management and sales. Address Box 46-687 care Paper Trade Journal. O-24

POSITION WANTED WITH MILL AS SALES REPRESENTATIVE OR IN ADVERTISING AND SALES PROMOTION DEPARTMENT. YOUNG MAN JUST OUT OF SERVICE. REFERENCES. Address Box 46-682 care Paper Trade Journal. O-3

BOMBER COMMANDER—Recently discharged from the Air Corps, with prewar experience in fine and coarse papers, desires sales position with paper mill or converter selling products in Cincinnati and 200 mile radius therefrom. Will handle lines on brokerage or sales representative basis. Highest references as to character and ability. Address Box 46-693 care Paper Trade Journal. O-3

PLANT MANAGER—Thorough experience in converting paper and boards; wants change to position offering better opportunity. Excellent production and labor relations background. Address Box 46-694 care Paper Trade Journal. O-31

FOR SALE

FOR SALE

PAPER MACHINE STEAM TURBINE DRIVE

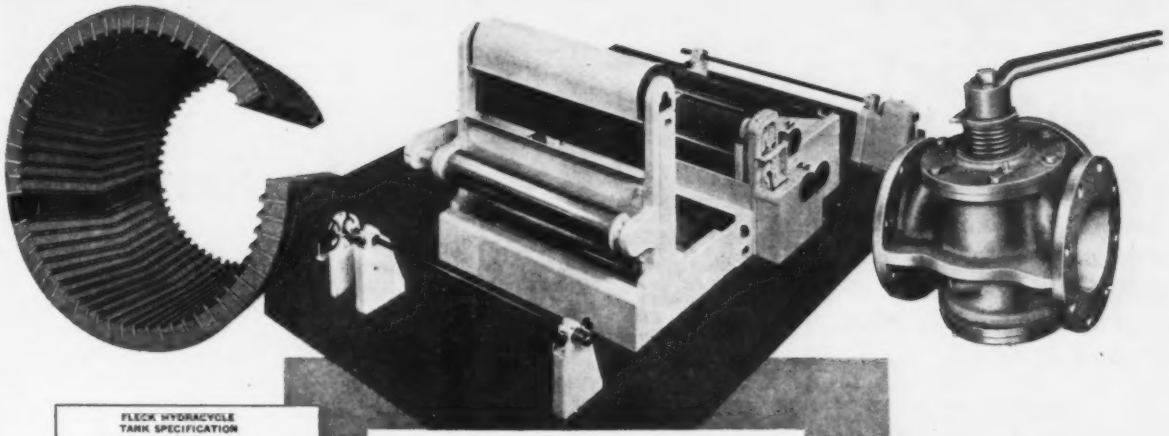
230 H.P. Terry GA Turbine and Gear connected to 24" diameter pulley all on one solid base. Steam inlet 190 pounds. Back Pressure 25 pounds.
With Woodward Governor for speed control through wide range.
This unit is in excellent mechanical condition and a fine buy for anyone needing a paper machine drive for immediate shipment.

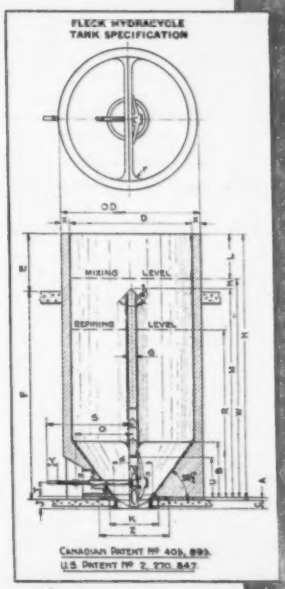
FERNSTROM PAPER MILLS, INC.
POMONA, CALIFORNIA TF

FOR SALE—Knowlton Spiral Winder complete with motors, tube cutters, roll slitter and other paper tube machinery—immediate shipment. Theo. Adams, 111 W. Washington St., Chicago, Ill. O-3

FOR SALE—50" Sheridan New Model Cutter, in good working order. Address Box 46-690 care Paper Trade Journal. O-3

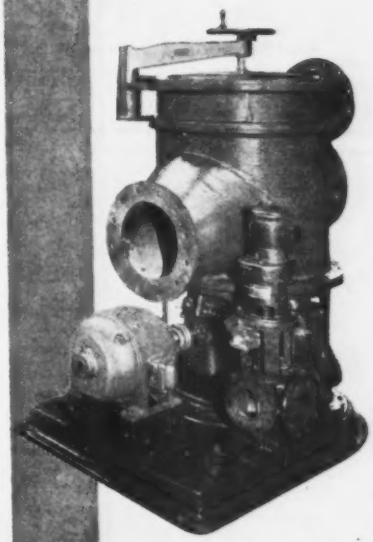
FOR SALE—Printing and Cutting Press Babcock 22" x 27½" flat bed printing press with steel jacket for die cutting. Address Box 46-692 care Paper Trade Journal. O-3

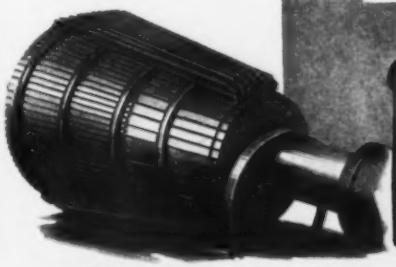


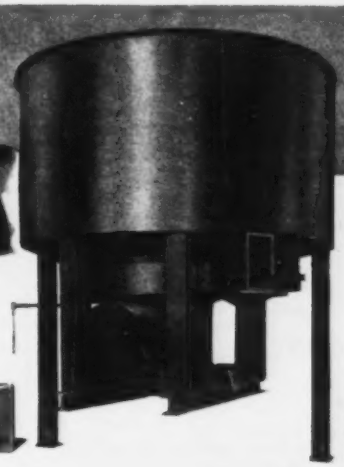


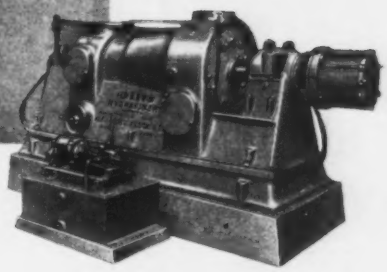
WHOM TO CONTACT

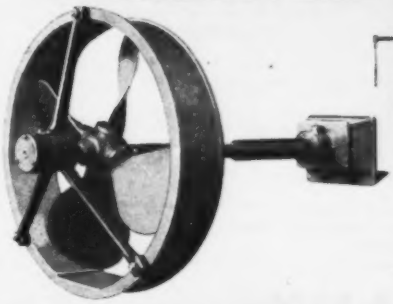
- On pulping, de-inking, mixing, refining — **Shartle or Dilts.**
- On cleaning, agitation, chests, jordaning, fillings — **Shartle.**
- On waxing machines, water finish attachments, other converting equipment — **Dilts.**
- On paper machines, paper machine drives, finishing end equipment, consult **Black-Clawson.**
- *If located in Canada, take it up with* **Alexander Fleck Limited.**

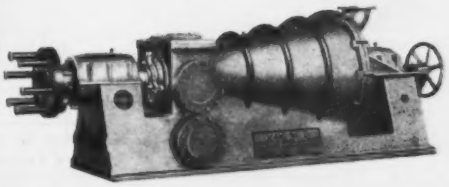












THE BLACK-CLAWSON CO.
HAMILTON, OHIO

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DILTS MACHINE WORKS, FULTON, NEW YORK
Associate: Alexander Fleck Limited, Ottawa, Ontario, Canada

FOR SALE

FOR SALE

Barrett - Craven and Lewis - Shephard Lift Trucks, in excellent condition, 3,500# and 5,000# capacities, 7" high in lowered position, 3" and 4" lifts.

EMPIRE BOX CORPORATION

Garfield, New Jersey

TF

FOR SALE

1—84" Hudson Sharp roll-to-roll Embossing machine, embosses from two rolls at a time; with engraved rolls for "basket weave" and, "ribbed" patterns.

1—40" German disc ruling machine.

1—Type 41-N Oklahoma City Vac-Control for keeping web straight.

1—30" Late type Model D Fales Slitter and Rewinder equipped with knife setups to cut following widths: ¼, 9/32, 5/16, 11/32, ⅜, 13/32, 7/16 and ½ inches.

1—68" Type 40B Hudson Sharp Toilet Paper Converter. Perforates 5" lengths toilet or 10" paper towels.

3—Single Hamblet Rotary Sheet Cutters, 1—75"; 2—84". Slitting attachment, 8 roll backstands and layboys.

1—84" 3 shaft Model 30B Hudson Sharp Toilet Paper Perforator cutting sheets 4½ x 5, 4½ x 4½, 11 x 15, 11 x 13½, 11 x 7½ inches. Known as a hard wound roll machine.

4—Complete spiral tube winders with automatic cut-offs, also recutters. 2 Langston and 2 Knowlton manufacture.

GIBBS-BROWER COMPANY, INC.
21 East 40th St., New York 16, N. Y.
TF

FOR SALE

FOR SALE

2—No. 55—72"x18'—Erie city return tubular boilers. 125# pressure each rated 156 H.P. Purchased new Sept. 1941.

KEUKA PAPER CORP.
Penn Yan, N. Y.
O-17

FOR SALE

Two Valley Holland type Beaters complete with pulleys and 450 HP synchronous motor fitted to drive both beaters as a pair. Bearings and stands included. Each beater has a capacity of 1000# stock at 3% consistency. Now in operation but available very soon. Print of beaters supplied on request. Address Box 46-677 care Paper Trade Journal. O-3

FOR SALE—One 38" two color Rotogravure Press. Sheet feed and pile delivery. Practically new. Address Box 46-541 care Paper Trade Journal. TF

FOR SALE—Cellophane. Available in small cut size sheets, either moistureproof or plain. Fairly prompt delivery. Address Box 46-603 care Paper Trade Journal. TF

FOR SALE

BEATERS
1—2000 lb. Holyoke-Iron Tub Beater.
2—1200 lb. E. D. Jones (no tubs).
1—1000 lb. Dayton Beater (no tub).
1—400 lb. Gavit—iron tub beater.
1—Breaker Beater—Dilts Bandless Roll 62" diameter x 54" face—70 tons daily capacity. Equipped with Shartle Bros. Ragger.
1—Bandless Breaker Beater Roll, 16" diameter x 54" face.

BLOWERS
2—Buffalo Forge Company—Size 7—Duplex Conoidal steel plate Blowers. Ball bearing.

CALENDER STACKS
1—5 roll 84" face—Farrel.
1—6 roll—72" face.
1—7-roll 36" Holyoke Machine. (supercalender)

CENTRAP
1—Shartle Brothers Centrap.

COATING MACHINE
1—26" six roll coating machine.

CYLINDER MOULDS
1—30" diameter x 74" face.
2—30" diameter x 54" face.
1—30" diameter x 75" face.
1—36" diameter x 84" face.
1—36" diameter x 80" face.

DOCTORS
14—Dillon Doctors—complete with accessories—98" face.

DRIVES
4—Smith & Winchester Drives.
1—Moore & White mortise gear drive.
1—D. O. James 75 H.P. Speed Reducer with couplings and motor base. Ratio 2.16 to 1. 900 RPM to 418 RPM.
7—D. O. James Angle Drives—11 to 1—12 to 18 h.p.

DRYERS
1—28" diameter x 76" face.
1—48" diameter x 94" face.
1—24" diameter x 84" face. (Baby)
2—36" diameter x 64" face, with frames gears and bearings.
2—72" x 120" (Baby Dryers).
2—80" x 120".
1—48" x 100".
1—36" diameter x 38" face.

ERKENSATORS
2—I. W. E. Erkensators—bronze construction—complete with motors, starters and distributing box.

FLAT SCREEN
1—4 plate Flat Screen.

HYDRAULIC PRESSES
1—Lake Erie Engineering Co., 78 ton, platen 12" x 12".
1—Watson Stillman, 60 ton, platen 14" x 14", with triplex pump and motor.

JORDANS
1—No. 2 Miami Jordan.
1—No. 9 Emerson Jordan—for direct connection to a motor.
1—Noble and Wood, Monarch, new fillings.

MOTOR
1—25 h.p. motor, including starting equipment.

PRESS ROLLS (Rubber Covered)
1—27½" diameter x 186" face.
1—26" diameter x 185" face.

PULP EQUIPMENT
1—32" three pocket Glens Falls Grinder (for 27" wood).
1—4 knife Carthage Chipper, with 2 sets of spare knives.

PULP SCREEN
1—IMPCO centrifugal pulp screen design No. 3.

PULPER
1—Jones Pulper.

PULVERIZER
1—Erie coal pulverizer.

PUMPS
1—6 x 2L Connersville Vacuum Pump.
1—No. 7 Sturtevant Vacuum Pump.
1—Buffalo Pump—5500 g.p.m. direct connected to 100 H.P. Motor (50' head).
Various sizes of Centrifugal and Plunger Pumps. Write us regarding your particular requirements.

RAG CUTTER
1—Taylor Stiles, 14", Little Giant.

REDUCERS
2—Westinghouse Gear Motors—25 h.p.—115 output r.p.m.—3/60/440.

REELS
1—72" Downingtown Expansion Reel.
1—2 Bowl Reel — 112" face — bowls 20" diameter.
1—2 Bowl Reel—110" face.
1—Set Stack Reels, capacity trim 143".

ROLLS
500—Brass tube—steel tube—rubber covered iron rolls—various sizes.

ROTARY SCREENS
3—Moore & White Rotary Screens (alternating diaphragm type).

SAVEALL
1—Saveall 36" diameter x 96" face cylinder mold. (With iron end vat.)

SCREW PRESS
1—Valley Iron Screw Press.

SCREEN PLATES
36 plates—43 x 11 3/32"—.050 cut—bevel edges.
24 plates—Recently recut .008.
12 plates—Recently recut .035.
Also other sizes and cuts in stock.

SHREDDERS
1—No. 25 CRSE Mitts & Merrill Hog.
1—Gilman Shredder.
1—Waterville Shredder.

SHEETERS
1—128" Moore & White Sheeter with layboy.
1—48" Langston heavy duty chopper (this is a combination machine, combining a slitter, scorer, sheeter and chopper.)

SLITTERS AND WINDERS
1—52" Johnstone Slitter & Winder.
1—36" Beck Razor Blade type Slitter & Winder.
1—60" Moore & White Slitter and Winder set for 3/8" slits.
1—60" Moore & White Slitter and Winder set for 7/16" slits.
1—120" Moore & White 4 drum slitter.
1—80" 2 drum Warren Winder.

STOCK PUMPS
1—12 x 20 Triplex Shartle.
1—8 x 18 Duplex Friction Co.
1—10 x 12 open impeller. (All lead).
Numerous other Centrifugal Stock Pumps. Advise as to your requirements.

SUCTION BOX
1—Nash 100" face Suction Box.

TOILET AND TOWEL MACHINES
1—65" Towel Machine.
1—85" Toilet Machine.

V-BELT DRIVES
1—{23" diameter x 14" face, 10 grooves.
{15" diameter x 14" face, 10 grooves.

WET MACHINE
1—74" Moore & White.

We are always in the market to purchase your surplus or idle machinery. What have you to offer?
Wanted Cylinder and Fourdrinier Machines (complete mills).

J. J. ROSS COMPANY

250 Frelinghuysen Ave. **Tel.—Bigelow 3-3720** **Newark 5, N. J.**

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ROSS PAPER MACHINERY CO.

265 PASSAIC STREET
NEWARK 4, N. J.

CONVERTING
PAPER MAKING EQUIPMENT

NEW, USED, REBUILT
PAPER AND PULP MACHINERY

JACK ROSS, President

1—Shartle Brothers 2 cylinders—120" machine. (Can supply four additional cylinders and vats). Machine includes:—2 pairs of baby presses, 3 pairs of primary presses, 2 pairs of main presses, 27 dryers 36" diameter x 115¼" face—3 deck—spare cylinder mould and couch. Drives, stands, line shaft and pulleys. Blue prints available.

1—Farrel Birmingham 16" Asphalt Extruder Complete.—Used 7 months.

AIR HOISTS
2—Two-Ton Ingersoll Rand
2—Five-Ton Ingersoll Rand

BEATERS
2—1000 lb. Horne Iron Tub.
2—1200 lb. E. D. Jones Iron Tub Beaters with washers.
2—1200 lb. E. D. Jones Beater—no tubs.
3—Valley Iron 750 lbs. Iron Tub Beaters, with Silent Link Belt Drive.
1—1200 lb. Noble and Wood—no tub. Spare new fillings for roll.

BIRD SCREEN PLATE
17 Plate—60 cut. New condition.

BLEACHERS
2—Fletcher high density bleachers—used 3 months.

BLOWERS
1—American ball bearing blower, size 17" x 23" for motor drive.
1—American Blower, size 40. For belt drive.

CALENDER DOCTORS
1 set of 16 Warren Doctors 104" face with frames.
60 Warren Doctors—various sizes.

CALENDER ROLLS
38 rolls various sizes

CALENDER STACKS
1—6 roll Beloit, 110" face.
2—2 roll Holyoke 36" face.

CONVERTING EQUIPMENT
1—Sanitary Napkin Machine. With motors and starters.
1—Bliss Double Head Stitcher.

COUCH ROLLS
2—18" diameter x 92" face—brass covered.
3—20" diameter x 92" face—brass covered.

CREPING MACHINE
1—Complete Bagley & Sewall Creping Machine. Dryer 100" face x 48" diameter. Ball bearing equipped. Used 6 months.

CYLINDER MOLDS
3—Impco—84" face—40" diameter with stainless steel face wire
2—110" face x 36" dia.
1—96" face x 36" diameter—with ball bearings and cast iron end vats.
4—84" face x 36" diameter.
4—Cylinder Molds—cast iron and vats—cylinders 120" face x 36" diameter. Ball bearing.

DANDY ROLLS
2—122" face 10" dia.
1—138" face 12" dia.
1—129" face 9½" dia.

DRIVES
1—Falk 25 h.p.—7.5 to 1.—1750 r.p.m.

DRYER DOCTORS
40—Warren Doctors. Various sizes.

DRYERS
38—48" Dia. x 46" Face, Chromium Plated.
2—24" Dia. x 48" Face.

ELECTRIC HOIST
1—Sprague Electric 3 ton hoist—5 h.p. 3 phase—60 cycle—110 volts.

FLAT SCREENS
3—Harmon 16 plate.
4—Harmon 10 plate.
1—8 plate Sandy Hill Packer—roller shoes.
1—Sandy Hill 2 plate flat screen.

FORK TRUCK
1—New Gasolene Fork Industrial Truck—1 ton capacity.

FOURDRINIER SHAKES
1—Beloit Fourdrinier Shakes.
1—Sandy Hill Bertram Shake. Late type.

FOURDRINIER WET END
1—120" Beloit Fourdrinier Wet End.
1—74" Pusey & Jones Wet End.

GRANITE ROLLS
2—112" face 20" diameter.

HAMMERMILLS
1—American Hammermill—37" anti friction bearing equipped.
1—Williams 18" Hammermill Ball Bearing.

HOG
1—Mitts & Merrill Hog. Number 5252.

JORDANS
1—Noble & Wood Mammoth Junior.
2—E. D. Jones Majestic Jordans, with one new set of fillings for both plugs and shell—belt driven.
2—#2 Miami Jordans—motor driven.
1—E. D. Jones Imperial Jordans—belt driven.
1—Smith & Winchester 30 ton capacity—belt driven.

LINE SHAFT
1—Complete line shaft with pulleys and pillar block.

PLATERS
2—Holyoke 2 Roll 18" dia. 36" face.

PULLEYS
60—Cone Split and Solid Cast Iron Pulleys. Various Sizes.

PULP SCREENS
4—Wells Screens.
6—Trimbey Screens.

PULP EQUIPMENT
1—126" face Kamyr Press.
1—84" Sumner Disc Barker with motor.

PULPERS
1—Voith Pulper 20 tons cap.
1—Bird Pulper.

PUMPS
4—Ingersoll Rand 250 g.p.m. 1740 rpm 90' head —4" suction—3" discharge. Direct connected to 10 hp. General Electric 220-440 volt—3 phase—60 cycle motor.
4—Ingersoll Rand 500 g.p.m. 1745 r.p.m.—80' head—4" suction—3" discharge. Connected to 15 h.p. General Electric 220-440 volt—3 phase—60 cycle motor.
4—Worthington Pumps 10,000 g.p.m.—35' head. Requires 75 h.p. at 550 r.p.m.
1—DeLaval 6" x 6".
1—DeLaval 1800 g.p.m. 30' Head, 500 r.p.m.—8" Suction—10" Discharge, Ball Bearing—Belt Driven—or for Direct Connection to Motor. Open Impeller.
2—Worthington Close Coupled Centrifugal Pumps. 6" x 6" 650 g.p.m. 25' head. 6 h.p. Star Electric splash proof motor. 1750 r.p.m. 440 volt, 3 ph.-60 cycle, ball bearing.
16—Warren Vertical Pumps. 6" suction. 5" discharge. 138 g.p.m. 60' head. Direct Connected 5 h.p. General Electric motor, 1750 r.p.m. 440 volts, 3 ph.-60 cycle, ball bearing.
1—Warren Close Coupled Centrifugal Pump. 3" suction. 2" discharge. 60 g.p.m. 50' head. 6 h.p. General Electric 1750 r.p.m. 440 volts, 3 ph-60 cycle, ball bearing.
2—Worthington 2", 2 stage, 200 g.p.m. 224' head. Bronze Ball Bearings.
1—Worthington 400 g.p.m. 35' head 1750 r.p.m. Ball bearing.
2—La Bour Company self priming ball bearing pumps. 2½" suction. 2½" discharge. 150 g.p.m.—30" head with extended base for motor.
295 additional pumps in our warehouse—various sizes.

REELS
1—Black-Clawson 2 Bowl—120" face. Takes 36" diameter roll.

REFINERS
1—Weiner Refiner 24" with extended base for direct connection to motor.

ROLLS
40—Table, Dress, Felt, Wire, Breast and Calender Rolls. Various Sizes.

ROTARY COOKER
1—Rotary Cooker—6' dia. x 21' long—complete with drive.

ROTARY SCREENS
2—#2 Bird with copper vats.
2—#1 Bird with steel vats, lead lined.
4—Moore & White.

RUBBER PRESS ROLLS
1—135" Face—28" Diameter } Used 20 Days
1—106" Face—27½" Diameter }
1—119" Face—19⅛" Diameter.
1—109" Face—17½" Diameter.
1—120" Face—19" Diameter.
1—118" Face—18" Diameter.
1—120" Face—18" Diameter.
1—107" Face—18" Diameter.
1—106" Face—18¼" Diameter.

SAVEALLS
1—A. D. Wood cylinder 48" dia. 60" face.

SCREW PRESS
1—Valley Iron Screw Press. Used 2 years.

SHEETERS
1—90" Hamblet Duplex.
1—60" Beloit Single Knife heavy duty.

SHREDDERS
2—24" Sprout Waldron heavy duty shredders—anti friction bearing equipped.
1—Taylor Stiles Portable Pulp Shredder—on wheels.
1—Rythor and Pringle Shredder.

SLITTERS AND WINDERS
1—82" Warren two drum—fully rebuilt.
1—41" Waldron Slitter and rewinder. Roll embossing attachment.

STEAM LOCOMOTIVES & WOODLAND EQUIPMENT
1—32 ton 36" gauge Shay-Lima locomotive. Air pressure 150 lbs. P.S.I. with a large lot of new spare parts.
1—40 ton 36" gauge Improved Climax Locomotive. Boiler pressure 150 lbs. P.S.I. with a large lot of new spare parts.
30—36" gauge wood cars. 40,000 lbs. log or pulpwood capacity. Used 4 months.
1—Sheffield motor car, manufactured by Fairbanks Morse—36" gauge—New.

STUFF PUMPS
1—12" x 20" Shartle triplex.

SUCTION BOXES
3—Brass Suction Boxes—116" face—8" wide—adjustable.

SUPERCALENDER STACKS
1—9 roll Norwood 83" face. Bottom roll 24" diameter. Top roll 20" diameter.

TURBINES
1—Westinghouse 125 h.p. 125 steam pressure—15 back pressure. Complete. Used 1 year.

TURBINES—PAPER MACHINE DRIVE
2—General Electric Turbine Paper Machine Drive 250 h.p.—350 r.p.m. 125 lb. steam pressure. 30 lb. back pressure.

UNWINDERS
1—42" John Waldron Unwinder. Used 1 year.

VACUUM PUMPS
3—14" x 20" Connersville.

WET MACHINES
2—Glens Falls 84" Wet Machines—cylinder mold 36" diameter with 19" rubber couches.

YANKEE DRYERS
2—Beloit 8' dia. x 175" face—75# working pressure.
1—Beloit 5' dia. x 194" face—75# working pressure.

THE ABOVE IS A PARTIAL LIST OF EQUIPMENT OFFERED FOR SALE.
NO CONNECTION WITH ANY OTHER FIRM OF SIMILAR NAME.

FOR SALE

FRANK H. DAVIS CO.,

ESTABLISHED 1889

USED AND REBUILT PAPER MACHINERY.

FOR SALE

BARKERS
1—48" Waterville

BEATERS
2—Holyoke 66 x 60, iron tub
1—2000 lb. Horne, iron tub Broke Beater new 1941, roll bandless 60 x 48
1—Horne patent 60 x 60, bronze bars

CALENDER
Set of 124" rolls, bottom 22"; 2-16"; 8-12"

CUTTERS
1—110" Hamblet duplex
1—84" Clark with Moore & White layboy
1—63" Smith & Winchester undercut
1—Taylor Stiles rag cutter
1—Daniels rag cutter

DECKERS
1—30 x 95 Black & Clawson
1—30 x 74" Impco
3—Apmew Filters, mould 50" x 100"

DRYERS
1—8' x 86"; 1—6' x 102"; 1—6' x 106"
2—8' x 175"; 1—8' x 194" new 1939

EMBOSSERS
1—80" Hudson Sharpe Embossing Machine

FANS
2—Buffalo double turbo 6½ Conoidal forced draft fans

JORDANS
2—Union Standard for motor drive
1—N & W Pony Monarch
1—Claflin #2

FOURDRINIER PARTS
1—Rice Barton, wire 100" x 31', rebuilt with 2 Reeves drives
1—Pusey & Jones, wire 133" x 61' 2", running at 500 F P M
1—48"
1—22 x 104 Suction couch.
1—14½ x 86" Suction couch.

LOCOMOTIVE
1—Alliance, also 7000 feet of 60 lb. track with connections

MIXER AND COOKER
1—25 gallon cooker #75

PULPERS
1—#1 Lannoye
2—Jones with Falk reducers and motors 440 volts, 3 phase, 60 cycle
1—Lannoye #2

PUMPS
1—10 x 10 Beloit triplex
2—10 x 12 Deane
1—#7 14 x 20 Roots vacuum pump, bronze fitters

SCREENS
2—Bird #2
2—Bird #2A
2—Moore & White #2
1—Leith Walk
4—12 plate Packer
2—10 plate Impco flat, bronze vats, new 1940
6—14 plate Impco flat, bronze vats, new
2—6 plate; 1 roller shoe
4—New 10 plate, Witham vats
2—New 8 plate, Witham vats

SHREDDERS
2—Mitts Merrill #15 C.F. direct cont. to 125 H.P. 440 v. motor
1—Waterville
1—Carthage
1—Rythor & Pringle
Mitts Merrill type 14A P E S #C 19026

SLITTERS
1—150" Moore & White four drum
1—120" Kidder two drum
1—114" Moore & White four drum, wids 60" roll
1—84" Bagley & Sewall
1—80" Cannard
1—26" Kidder two drum
1—115" four drum.

WASHERS
2—2000 lb. Union Mach. steel tubs

Builders of

ASPHALT COATING, COMBINING MACHINE, GUMMING AND CREPING MACHINE, ROLL GRINDER

FRANK H. DAVIS COMPANY
175 Richdale Ave., Cambridge, Mass.
TF

FOR SALE

1—44"
1—56"
1—63"

Used Cranston Under-cut trimmers.
2—Jolly Flat Auxiliary screens with screen plates.

Apply Box 46-662 care Paper Trade Journal. O-3

FOR SALE

PAPER MILL FOR BRAZIL

Responsible Brazilians interested purchase complete paper manufacturing plant suitable for manufacture of sulphite bonds and plain book papers from imported pulps. Minimum daily production fifteen tons. Must include sheeters, trimming machines, etc. Disposed make agreement with American manufacturers on partnership basis, contracting for American technical management.

Write full details by letter so personal discussions may be arranged. Address:—Box 46-661 Paper Trade Journal.
O-3

FOR SALE

1—Warren Improved 2 drum winder with top and bottom slitters. Trims 105"
2—Calender rolls, 12" dia., 88" face, 6" journals
2—Rubber covered press rolls 18" dia., 80½" face. Journals 7" dia., 9" long, 84" between shoulders.
1—Rythor & Pringle paper duster. 8'x6'x 16'.
1—Brass press roll 18" dia., 80½" face 84" between shoulders
1—Granite press roll 18" dia., 80½" face, 84" inches between shoulders
1—Fan pump 12" inlet, 8" outlet
1—Split pulley 72" dia., 20" face. Extra heavy
1—Split pulley 60" dia., 19" face. For Brownell twin engine
6—4" Moore & White expansion winder shafts. 2—19", 2—31", 2—46"
2—10 plate flat screens. 2—12 plate flat screens
1—American Thompson Improved Indicator (For steam engines)
1—250 gal. Worthington pump, direct connected to 15 HP G. E. Motor 60 cycle 3 phase 220 volts with starter and panel
2—75 HP G. E. Motors 600 rpm, 60 cycle 3 phase 440 volts

FRANK P. LYDEN
Fort Edward, N. Y. O-17

MACHINERY FOR SALE

2—Impco Pulp Screens of design No. 3.

2—Gould, size 8", double suction centrifugal pumps mounted on baseplates but without motors. These pumps are Fig. 3450, rated 1600 GPM at 25 ft. head and require a 15 HP 1200 RPM motor. One pump is new and one pump is slightly used but in good condition.

3—Saranac Oyster-pail machines, hopper feed.

2—Saranac Butter-dish machines, hopper feed.

STEVENS & THOMPSON PAPER COMPANY
Greenwich, New York
TF

GOOD VALUES FOR THE PAPER MILL

68" Rice, Barton, Fales Slitter-Rewinder.
80" and 110" Mill Type Sheeters.
34" Inman Slitter.
54" Brown & Carver Power Cutter.
29" x 41" Miehle Cutter & Creaser.
36" Burton Slot-hole Perforator.
2—14" x 22" John Thomsons.
Robinson Double Corner Cutter.
American heavy duty Cross-Cut Saw.
Baling Presses—NEW—Hand and Power.

THOMAS W. HALL COMPANY, INC.
120 West 42nd St., New York 18

FOR SALE—Two J. H. Horne Large Type Jordans, one arranged for belt drive and the other for direct connection to a motor. Address Box 46-655 care Paper Trade Journal. O-10

FOR SALE—1 Hamilton-Corliss Variable Speed Twin Engine, size of cylinders 12" x 24". Also Triple-Deck Frames for ninety 36" dryers, any width. The Chesapeake Paperboard Co., Baltimore 30, Md. TF

FOR SALE

REVAMPING AND REBUILDING MILL AND CAN OFFER FOR SALE

1—Noble & Wood Mammoth Jr. Jordan ¼" Filling. Now operating.
1—Brass covered finishing press roll—17¾" diameter x 89½" face.
1—4000# Capacity motor driven freight elevator with automatic stop control—can be inspected in operation at our plant.
1—8" Lawrence Centrifugal Water pump.
2—8" Barnes Centrifugal Sewage Pumps.
8—100" Screen plates for No. 2-A Bird Screen. Slots, .022—never used after being recut once.
1—Rubber covered press roll 12" diameter by 68" face—Journals 5" diameter by 7¼" long.
1—Rubber covered press roll 12" diameter by 84¼" face—Journals 5" diameter by 7¼" long.
1—20" face cast iron tapered pulley—2 15/16" Bore, Taper 31"-29½".
2—20" face cast iron tapered pulley—3 7/16" Bore, Taper 31"-30".
1—24" face cast iron tapered pulley—3 7/16" Bore, Tapered 31⅝"-29⅝".
2—Steel split pulleys 60" diameter by 31" face —5 15/16" bore.
1—Cast iron split pulley—60" diameter by 21" face by 3½" bore.
1—Cast iron split pulley—40½" diameter by 21" face by 3½" bore.
1—Cast iron split pulley—84" diameter by 36" face by 5 15/16" bore.
1—Cast iron split pulley—72" diameter by 18" face by 10" face by 8½" bore.
2 —Steel split pulleys—60" diameter by 41" face by 5 15/16" bore.
1—Paper pulley—24" diameter by 21" face by 4½" bore.
1—Tapered cast iron split pulley. Taper 30" to 28½" by 20" face by 3 15/16" bore.
1—30" x 90" Cylinder mould—7" diameter shaft inside cylinder.
1 9½" diameter x 85" Face Rubber-covered squeeze or wringer roll-Journals 1 15/16" diameter.
1—9" diameter x 88" Face Calender roll—9" diameter journals.
13—6½" dia. x 92" face steel drier felt rolls with 1 7/16" x 6½" Journals.
3—4" Gould centrifugal stock pumps with 2 vane open impeller. Capacity 600 G.P.M. at 40' head—1175 R.P.M. with 10 H.P. Operated less than two years.
2 —Pair Noble & Wood lighter stands complete with lighter beams and bearings for 9" diameter journal beater roll.

A visit to the mill would prove profitable as we have many items for sale too numerous to mention. See our superintendent, Mr. O. P. Fussell at our plant in Walloomsac, N. Y.

WALLOOMSAC PAPER MILLS, INC.
Mills: Walloomsac, New York
Main Office: 25 Vanderbilt Avenue
New York 17, N. Y. TF

FOR SALE

48" Meisel Spot Sheeter with Layboy
64" Waldron Drum Rewinder
44" x 64" Sheridan Die Cutter Model #25
Hayssen Heat Seal Carton Wrapper
28" x 38" Seybold Embosser & Die Cutter
63" & 74" Langston Cut-Off Knives
30" x 50" Cottrell Die Cutter
36" Rotary Printer, Sgle. Color

Write for bulletin listing 70 machines for paper converting and box manufacturing now available.

SOUTH WABASH ENGINEERING CO.
2929 S. Wabash Ave., Chicago, Illinois
O-10

FOR SALE | FOR SALE | FOR SALE

FOR SALE

26—SETS NEW 2 TON YALE & TOWNE SPUR GEARED HIGH SPEED CHAIN HOISTS, BALL BEARING EQUIPPED, SPECIAL 20 FT. LIFT CHAINS.

2—SETS NEW 3 TON WRIGHT HIGH SPEED CHAIN HOISTS, SPUR GEARED, ANTI-FRICTION BEARINGS, SPECIAL 20 FT. LIFT CHAINS.

1—Sturtevant Bale Pulper, just taken out of service where it pulped 60 to 75 tons Kraft Pulp daily. Excellent condition.

1—Buffalo Knife Grinder, 48" working carriage.
1—Jeffrey Shredder.
1—48" Tube Winder.
1—48" Coating Machine.

3—Shartle cast iron tub breaker Beaters or Washers, roll 80" dia., 55" face, anti friction bearings. Used less than one year.

1—Dilts 2000# new type cast iron tub beater with keyed type bandless roll, 66" x 60", also 1—hexagon type washing cylinder.

1—Horne type 1800# wood tub beater with roll 54" dia., 60" face, 4" cypress tub used less than 5 years. A bargain.

1—Valley Iron Works breaker beater roll, 67" dia., 60" face with new staggered bars, bearings, hoods, etc. All very good.

1—Weiner Refiner, very good condition.

2—Shartle Cyclafiners, new fillings, pin type coupling.

3—No. 2 Bird Screen, copper lined vats.

2—No. 2-A Bird Screens.

1—36" x 90" Cylinder Mould with anti-friction bearings, also cast iron vat end packing box assembly.

2—Black Clawson Wet Machines with cylinders 30" x 74", new vats, balance fully reconditioned.

1—48" Oswego Trimmer, guillotine type.
1—60" Smith & Winchester Undercut Trimmer.

Both above in very good condition.

4—Pairs New Shartle Press Housings (never installed) equipped with anti-friction bearing ratchet lifts.

5—Pairs Press Rolls (1 brass, 1 rubber covered) 16" dia., 77" face.

1—Set 1st and 2nd Press Sections including frames, stretches felt rolls, press rolls, etc., for 68" machine. These are very good equipment.

1—48" dia., 120" face Dryer.

1—112" Langston Slitter and Winder equipped with rider roll, will make rolls up to 60" dia.

1—106" Pusey & Jones two-drum Slitter and Winder, 16" dia. drums. Will wind rolls to 54" dia., fully reconditioned.

1—Bagley & Sewall tissue machine Reel, 136" face, 5' dia. spool, complete with stands and frictions. These reels were in use on machine until August this year.

1—Beloit 2-spool upright Reel, drums 126" face, 18" dia., 3 ft. 4" between drums, will make rolls 60" dia. These are modern, extra heavy type.

1—88" two-drum Bagley & Sewall Warren type Slitter & Winder (fully reconditioned).

3—Agitator Drives for vertical agitator. All enclosed gear speed reducing unit for chest approximately 12 ft. dia., 10 or 12 ft. deep.

3—Marshall Angle Drives built by Moore & White with double gear reduction and M. & W. frictions.

1—10" x 20" Shartle Triplex Plunger Stock Pump fully reconditioned.

2—10" x 11" Beloit Triplex Stock Pumps.

1—Frederick open impeller centrifugal stock pump, 12" inlet, 10" outlet, 1800 GPM, 75 ft. head at 1150 RPM.

2—Domestic open impeller stock pumps, 240 GPM, 40 ft. head, 1750 RPM.

1—DeLaval Certifugal Water Pump, 1550 GPM, 60 ft. head, 1750 RPM.

2—Ingersol-Rand Centrifugal pressure Pumps, 500 GPM, 104 ft. head, direct connected to 20 HP G. E. motors, 3 phase, 60 cycle 220 or 440 volts (like new).

4—New Gould all bronze centrifugal water pumps, 2000 GPM, 150 ft. head, 1150 RPM (Navy Surplus).

4—New Gould Pumps, 10,000 GPM, 100 ft. head, all bronze casings, stainless steel shafts, monel metal sleeves, 100 HP motors, 1200 RPM (Navy Surplus).

3—16" dia., 88" face rubber couch rolls, approximately 200 plastometer, 1½" to 2" rubber.

25—7' dia. x 172" face rubber covered fourdrinier Table Rolls. Will cut to fit your machine.

2—45" Indenting Rolls.

The largest stock of miscellaneous rolls, such as brass breast rolls, brass couch rolls, press rolls rubber covered and brass covered, and calender rolls, available anywhere.

"Every pound of paper is made on used equipment".

OSBORNE PAPER MILL EQUIPMENT CO.

FULTON, N. Y.

O-3

FOR SALE

BREAKER BEATER

1—Dilts Bandless Roll 62" diameter x 54" face—70 tons daily capacity. Equipped with Shartle Bros. Ragger.

J. J. ROSS COMPANY
250 Prellinghuysen Ave., Newark 5, N. J.
Tel. Bigelow 3-3720 **5-26**

FOR SALE

New brass covered felt or wire rolls 6¼" dia., 84 to 120" face. These are made from government surplus and are new in all respects.

Osborne Paper Mill Equipment Co.
Fulton, N. Y. **TF**

FOR SALE—Electric Hoists, new, in stock. Shaw-Box 100 lbs. and 4000 lbs. capacity. "Budgit" 250, 500, 1000 and 2000 lb. capacity. I-Beam Trolleys and Cord Reels. Mansel L. Rankin, 1741 Columbus Ave., Sandusky, Ohio. Phone 481. O-10

PAPER COATING MACHINERY — Waxing, Oiling, Gumming, Gluing, Carbon, Laboratory Coating and Treating Machines. High speed New improvement. MAYER MACHINE COMPANY, Inc., 1155 Scottsville Road, Rochester, 11, N. Y. TF

FOR SALE—48" Inman Heavy Duty Slitter and Rewinder with approximately 40 sets of knives, 3 h. p. motor, v-belt drive. Minnesota Paper and Cordage Co., 730 Washington Ave., No., Minneapolis, 1, Minnesota. O-10

FOR SALE—1—Practically new Nash Hytor, Size H8, Vacuum Pump, 500 c f m with Louis Allis 40 HP, 3 ph., 60 cycle, 220-440 volt Motor. BRILL EQUIPMENT COMPANY, 225 West 34th Street, New York, 1, N. Y. TF

WANTED

WANTED TO BUY

Bond, Offset, Index, Manifold Ground Wood, Printing paper, Kraft, Glassine, Tissue, etc. Rolls or sheets. Box No. 46-680 care Paper Trade Journal. O-24

WANTED—COMPLETE GROUND WOOD MILL EQUIPMENT FOR APPROX. 12 DAILY TONS OR SEPARATE ITEMS TO COMPLETE INSTALLATION. QUOTE SUCH ITEMS SEPARATELY. Address Box 46-686 care Paper Trade Journal. O-10

FOR SALE

FOR SALE

FOR SALE

TARENTUM PRODUCTS CORP.

TARENTUM, PENNSYLVANIA

1—Majestic Jordan #A-235, complete with new filling, 3/16" tackle, No. 6 Fast Jordan Coupling, and following drive:

1 Westinghouse Induction Motor type CS 375 HP 2300 volts 3 phase 60 cycles 97 amp. 380 RPM Ser. #1463196 complete with one control panel, including one Westinghouse 300 amp. Oil Circuit Panel.

1 set Disconnect Switches.

1—Westinghouse DC Motor 75 HP 230 volts 265 amp. 575 RPM Frame 183 Ser. #4778560. Complete with starting control, circuit breaker and motor.

1—Elliott Water Pump, capacity 500 gallons per minute, serial #37075. Direct connected to one G.E. Motor 25 HP D.C. Type CD 85-230 91.3 amps 1750 RPM Ser. #1530365. Complete with one starting control and switch.

1—Westinghouse Generator 70 KW 250 volts DC 280 amp. 375 RPM Ser. #345451 with one Field Rheostat, one two-pole circuit breaker 600 amp., one Westinghouse 500 amp. ameter and shunt. This Generator driven by Buckeye Steam Engine, 100 lbs. steam pressure engine #5156.

1—2000 KW A.C. Turbine Generator complete with all accessories.

1—Allis-Chalmers Induction motor 250 HP 870 RPM 2200 volts, 3 ph 60 cy 59 amp. Serial #2K13566.1.

1—G.E. Induction Motor type KT 326-6-25-1200 Form B 3 ph 60 cy 220 volts 25 HP 61 amp. 1200 RPM Ser. #1053934 complete with one G.E. OIL Switch type F Form K20 80 amp 600 v Ser. #368400.

1—G.E. Starting Compensator CR1034 220 volts 3 ph 60 cy type NR 1622.

1—G.E. Induction Motor (slipring) Frame 15A 150 HP Form M 720 RPM 2200 v. 3 ph 60 cy 36 amp Ser. #1180132.

1—G.E. Induction Motor (slipring) Frame 15A 150 HP Form M 720 RPM 2200 v. 3 ph 60 cy 36 amp.

1—Westinghouse 30 HP D.C. Motor 220 volts 117 amp. 975 RPM Ser. #233501.

1—G.E. Motor DC Type MP Form H 20 HP 1025 RPM 220 volts 70 amp. Ser. #19880, complete with manual starting equipment.

1—104" Sheet Cutter complete with stands for 10 rolls, and layboy.

1—G.E. Motor DC Type RC30 Form A 15 HP 850 RPM 230 volts 53.5 amp. Ser. #957750, complete with variable speed control for armature and field.

1—G.E. Motor DC 7.5 HP 230 volts 30.2 amp 850 RPM Type RC-29A Form A29 Ser. #1145541.

1—G.E. Motor DC 10 HP 230 volts 375.1 amp 850 RPM Type RC 29 Form A29 Ser. #1148660.

1—Westinghouse DC Motor Type S 5 HP 220 volts 21 amp. 1300 RPM Ser. #112692.

1—G.E. Motor DC 35 HP 129 amp. 230 volts 700 RPM DLC 202 Form A Compound Ser. #434542, complete with starting control.

1—G.E. Induction Motor (slipring) Type IE 13AA-4-150-1800 FORM M 3 ph 60 cy 2200 volts 150 HP 34.5 amp 1745 RPM Ser. #3884576 complete with panel. One G.E. Switch Panel type ATI 59008, one Drum Controller and Resistance variable speed.

1—Master Electric Worthington Pump and Motor. Pump is good for 100 gal. per minute 5 HP Motor 230 volts DC 3425 RPM Ser. #CC-3495.

1—Robbins & Myers Hoist ½ HP 230 volts DC 400 RPM Ser. M71309KH.

1—Master Electric Gear Head Motor 1 HP 230 volts DC 1725 RPM Ser. CE863.

1—Shepard Liftabout Electric Hoist 2,000 lb. capacity 230 volts DC Serial #11339.

1—Wright Electric Hoist 1,000 lb. capacity 230 volts DC 1200 RPM Ser. #27668.

3—ILG Ventilating Fans ¼ HP 230 volts DC 855 RPM.

2—G.E. CP27 Compresser Head Air Pumps 230 volts DC Complete with pressure line switches.

1—Allis-Chalmers DC Motor 5 HP 220 volts 1050 RPM Ser. 44037.

1—Westinghouse DC Motor 10 HP 40 amp. 230 volts 1725 RPM Frame 60L Ser. #143833.

1—Daniels Rag Cutter #2.

1—Horizontal Rotary Digester 7' dia., 22' long with gearing reduction.

1—Horizontal Rotary Digester 8' dia., 20' long with gearing reduction.

1—Bucket type conveyor elevator. Buckets size 5" x 17", approximately 48' long, lifts on incline approx. 15'. All steel construction with Rex Chain Drive, complete with one Foote Bros. gear reducer type 25W 43 to 1 ratio, ser. 158052, driven by one G.E. DC Motor type RC27A Form A-38 5 HP 19.1 amp 230 volts 1150 RPM.

1—R40 Reducer, 12 to 1 ratio.

1—Slipring motor 75/150 HP Type CW 3 ph 60 cy 2200 volts 290/580 RPM Ser. #2224679, complete with starting equipment.

1—Slat conveyor steel construction 4' wide, 3' high, 42' long, driven by one Jones Spur Gear Reducer, ratio 27 to 1, Ser. #10135. Driven by one Sprag Electric DC Motor type LC 10 HP 37.2 amps 230 V 100 RPM Ser. #DL 2005213, complete with sheaves and V Belt drive, one Westinghouse Automatic Starter.

1—John Waldron Embosser #711.

1—Thorpe Hydraulic Press complete with 4 steam platen plates 40" x 40", and one Equalizer Pump.

1—Five cylinder Holyoke Duster.

1—Two-color Kidder Rotary Press, with various plates and printing rolls.

3—Beaters, 1000 lb., cast iron tub, complete with roll.

2—Beaters, high speed, 2000 lb., cast iron tub, complete with roll.

1—Banded type Emerson Beater Roll, 54" face, 56" diameter, complete with stands.

MISC.

Platform Scales.
Paper Testing Equipment.
Two-wheeled hand trucks.
One Shartle Bros. Duplex Stock Pump 8 x 16.

TF

WANTED

WANTED

Complete heavy duty paster or laminator of approximate 65" face for boxboard. Must have stands with heavy duty cut-off knife and slitter arm all in good condition. Write full details to Rockford Paper Mills, Inc., Rockford, Michigan.

O-10

KRAFT PAPER WANTED

Bag Converter, completely experienced and efficiently functioning organization, requires monthly 50 Tons 70 to 80 lb. High Grade No. 1 Kraft Paper 48" to 85" widths (will completely fill machine trim) 22" diameter. Let's discuss bonus or profit sharing arrangement, mutually satisfactory basis.

Box 46-669 care Paper Trade Journal. O-3

WANTED—Brightwood Box Machine. Address Box 46-33 care Paper Trade Journal. TF

WANTED — W & P Shredders, Evaporators, Generators and Boilers, Slitters, Cutters, Hydraulic Presses, Sheridan Presses, Dryers. Address Box 46-32 care Paper Trade Journal. TF

WANTED—Spot and Regular supplies Cigarette Paper, Mounted Aluminum Foil, Cellophane and other supplies. Address Box 46-668 care Paper Trade Journal. O-17

WANTED

NEWSPRINT EMERGENCY

Shun Pao, China's leading daily newspaper, urgently needs newsprint. Small or large amounts. Cash. Will also contract for future supply.

Telephone or Wire

Hiram Merriman

84 William St., New York 7 Worth 2-2800

O-10

WANTED—Paper Board Machine, capable of producing 35 to 100 tons folding box board daily. Replies held in strictest confidence. Address Box 46-651 care Paper Trade Journal. TF

KRAFT PAPER — Wanted — Side runs, end trims. Can use all widths like 2" or 3" up to 50", up to 36" diameters. American Cordage Co., 11 Commerce SW, Grand Rapids, Michigan. O-10

WANTED

WANTED—32" to 36" Waldron Paper Reel. Address Box 46-671 care Paper Trade Journal. O-3

WANTED—Roll Grinder for rolls up to 132" face and 30" diameter. Must be in good condition. Motors to be 3/60/440. Address Box 46-638 care Paper Trade Journal. N-7

WANTED—Large diameter dryer, 132" face or somewhat larger, diameter preferably six or seven feet. Fort Howard Paper Company, Green Bay, Wisconsin. O-10

WANTED — DISCARDED PAPER MILL FELTS. HIGHEST PRICES paid for all kinds of discarded paper mill felts. LARGE or SMALL QUANTITIES accepted. Prices quoted immediately on receipt of samples. ADDRESS: GLASER AND YOFFE, INC., 80 NORTH MAIN ST., NATICK, MASS. TF

WANTED—Three or four color rotary press for printing paper bags; and one half barrel bottomer. Must be in good condition. Give full details. Address Box 46-587 care Paper Trade Journal. TF

WANTED—Seybold heavy duty single head four rod die press, 38" x 24". Address Box 46-678 care Paper Trade Journal. O-17

WANTED — Bleached or unbleached Kraft, weights from 40 to 60 lb. Rolls 9" or wider. Can use up to 40" diameter in any quantity. Send samples and prices to Camotone, Inc., Mamaroneck, N. Y. O-3

WANTED—1,000,000 Multiwall Sacks or Bags, 3 ply plain or printed, new or used, approximate size 20 x 29. Send us your offers. Address Box 46-684 care Paper Trade Journal. O-3

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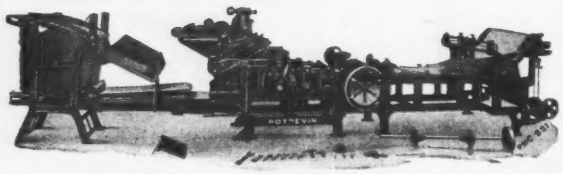

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Norton Co.
Raybestos-Manhattan Inc. Manhattan Rubber Division

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American Resinous Chemicals Corp.
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Casein Company of America
Flintkote Company
Monsanto Chemical Co.
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United States Rubber Co.

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Dorr Company
Downingtown Mfg. Co.
Hardinge Co., Inc.
Improved Paper Machy. Corp.
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D. J. Murray Mfg. Co.
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Moore & White Co.
Noble & Wood Machine Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Valley Iron Works Co.

AIR CONDITIONING
Spray Engrg. Company
Steamaire Company

ATOMIZERS
Steamaire Company

BAG MACHINES
Potdevin Machine Co.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Weber, Herman G.

BALING MACHINES
Thomas W. Hall Co.

BARKERS AND CHIPPERS
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Carthage Machine Co.
Fibre Making Processes, Inc.
D. J. Murray Mfg. Co.
Valley Iron Works Co.

BARS
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E. D. Jones & Sons Co.
The Moore & White Co.
Noble & Wood Machine Co.
Shartle Brothers Machine Co.
Valley Iron Works Co.

BEARINGS
Black-Clawson Company
Jones, E. D., & Sons Co.
Magnus Metal Corp.
Montague Machine Works
Raybestos-Manhattan Inc. Manhattan Rubber Division
Rollway Bearing Co.
Shartle Brothers Machine Co.
SKF Industries, Inc.
Timken Roller Bearing Co.
Valley Iron Works Co.
T. B. Woods' Sons Company

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The Appleton Machine Co.
Black-Clawson Company
Dilts Machine Works, Inc.
Downingtown Mfg. Co.
Hermann Mfg. Co.
E. D. Jones & Sons Co.
Noble & Wood Machine Co.
J. J. Ross Company
Ross Paper Machy. Co.
Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works

BED PLATES
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Dilts Machine Works, Inc.
Downingtown Mfg. Co.
Farrel-Birmingham Co., Inc.
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Noble & Wood Machine Co.
Shartle Brothers Machine Co.
Valley Iron Works Co.

BELTING
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Allis-Chalmers Mfg. Co.
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Raybestos-Manhattan Inc. Manhattan Rubber Division
J. E. Rhoads & Sons
United States Rubber Co.
T. B. Wood's Sons Company
Worthington Pump & Machy. Corp.

BLEACHING BOILERS, ROTARY
The Biggs Boiler Wks. Co.

BLEACHING APPARATUS
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Improved Paper Machy. Corp.
E. D. Jones & Sons Co.
Perkins & Sons, Inc., B. F.
Moore & White Co.
Niagara Alkali Co.
Noble & Wood Machine Co.
Pennsylvania Salt Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.

BLOW PIPES & PITS
Carthage Machine Co.
Montague Machine Co.
Moore & White Co.
Murray Mfg. Co., D. J.
Walworth Company

BOILERS
Babcock & Wilcox Co.
Biggs Boiler Works
Foster Wheeler Corp.

BOILERS (Electric)
Steamaire Company

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Harrington & King Perforating Co.
Kalamazoo Tank & Silo Co.
Valley Iron Works Co.

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Downingtown Mfg. Co.
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Lobdell Car Wheel Co.
Moore & White Co.
Perkins & Son, Inc., B. F.
J. J. Ross Company
Ross Paper Machy. Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works
Waldron Corp., John

CASEIN
Casein Company of America

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Black-Clawson Company
Carthage Machine Co.
Dilts Machine Works
Downingtown Mfg. Co.
Farrel-Birmingham Co.
Grinnell Company
Hamblet Machine Co.
Hardinge Co., Inc.
E. D. Jones & Sons Co.
Lobdell Car Wheel Co.
Magnus Metal Corp.
Montague Machine Co.
Noble & Wood Machine Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Union Machine Company
Union Screen Plate Co.
Valley Iron Works Co.

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De Laval Steam Turbine Co.
Nichols Engrg. & Research Corp.
Ross, J. O., Eng. Co.
Shartle Brothers Machine Co.
Williams Apparatus Co.

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Amer. Resinous Chemicals Corp.
Ansul Chemical Co.
Calco Chemical Co.
The Cowles Detergent Co.
Diamond Alkali Co.
Dispersion Process, Inc.
Dow Chemical Company
E. I. du Pont de Nemours & Co., Inc.
Falls Chemical Products Co.
General Dyestuff Corp.
Geigy Co., Inc.
Gottesman & Co.
Hooker Electrochemical Company
Mallinckrodt Chemical Wks.
The Mathieson Alkali Works, Inc.
Monsanto Chemical Company
National Oil Products Co.
Naugatuck Chemical Div. of U. S. Rubber Co.
Niagara Alkali Company
Paper Makers Chemical Department, Hercules Powder Co.
Pennsylvania Salt Mfg. Co.
Philadelphia Quartz Co.
Pioneer Salt Company
Pittsburgh Plate Glass Co., Columbia Chemical Division
Solvay Sales Corp.
United States Rubber Co.
Witco Chemical Co.
Wyandotte Chemicals Corp.

CLEANING MATERIALS
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Bird Machine Co.
The Cowles Detergent Co.
E. I. du Pont de Nemours & Co., Inc.
Paper Makers Chemical Department, Hercules Powder Co.
Magnus Chemical Co.
Monsanto Chemical Co.
Nichols Engrg. & Research Corp.
Oakite Products, Inc.
Pennsylvania Salt Mfg. Co.
Philadelphia Quartz Co.
Pittsburgh Plate Glass Co., Columbia Chemical Division
Solvay Sales Corp.
Wyandotte Chemicals Corp., J. B. Ford Division

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Hudson Sharp Machine Company
Farrel-Birmingham Co.
Fawick Airflex Co., Inc.
Hardinge Co., Inc.
Rodney Hunt Machine Co.
Moore & White Co.
D. J. Murray Mfg. Co.
The Sandy Hill Iron & Brass Wks.
Stearns Magnetic Mfg. Co.
T. B. Wood's Sons Company

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Mayer Machine Co.
Moore & White Co.
Potdevin Machine Co.
Rotogravure Engrg. Co.
Shartle Brothers Machine Co.
South Wabash Engrg. Co.
Waldron Corporation, John
Weber, Herman G.

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COMPRESSORS
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De Laval Steam Turbine Co.
Ingersoll-Rand Co.
Nash Engineering Co.
Worthington Pump & Machy. Corp.

CONDENSERS
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CONSULTING ENGINEERS
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Ferguson, Hardy S.
Hardy, George F.
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The Kohler System Company
Main, Inc., Chas. T.
The McPherson Company
Roderick O'Donaghue
The Rust Engrg. Co.
J. E. Sirrine & Co.
South Wabash Engrg. Co.
Stone & Webster Engrg. Corp.

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Cochrane Corp.

CONTROLS
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Cochrane Corp.
Stickle Steam Specialties Co.

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Ross Engineering Corp., J. O.

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Steamaire Company

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Rodney Hunt Machine Co.
Montague Machine Co.
Smith & Winchester Mfg. Co.
Sonoco Products Co.
Walker-Goulard-Plehn Co.

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Farrel-Birmingham Co., Inc.
Hardinge Co., Inc.
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Lovejoy Flexible Coupling Co.
Moore & White Co.
Noble & Wood Machine Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Valley Iron Works
Waldron Corp., John
Westinghouse Electric Corporation
T. B. Wood's Sons Company

CRANES
Northwest Engrg. Co.
Reading Chain & Block Company

CRUSHERS
Fibre Making Processes, Inc.

CUTTERS
Dilts Machine Works
Thomas W. Hall Co.
Noble & Wood Machine Co.
Perkins & Son, Inc., B. F.
The Smith & Winchester Mfg. Co.
South Wabash Engrg. Co.
Taylor Stiles & Co.

DAMPENERS
Perkins & Son, Inc., B. F.
Steamaire Company
Valley Iron Works Co.

DE-INKING
Dilts Machine Works
Hardinge Co., Inc.
Kinsley Chemical Co.
Shartle Bros. Mach. Co.

DIGESTERS
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Foster Wheeler Corp.
Pusey & Jones Corp.

DOCTORS
Bird Machine Company

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CONTINUOUS BEATING: Three No. 2 Claflins in series. Furnish of Southern Bleached Kraft — 50 tons/day. Pulping operation—through three Claflins—to beaters used only for mixing—to Jordans for final cutting control to paper machine. Total of 540 h.p. on Claflins. Freeness drop from 685 c.c. to 310 c.c.

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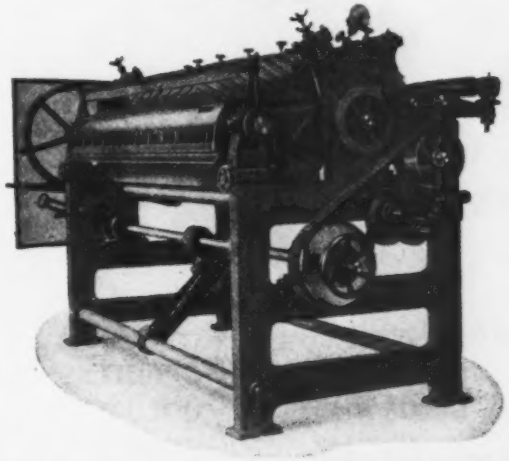

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Shartle Brothers Machine Co.

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Montague Machine Co.
Raybestos-Manhattan Inc.
Manhattan Rubber Division
Rotogravure Engrg. Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers
United States Rubber Co.
Westinghouse Electric Corporation

DRIERS

Black-Clawson Company
Murray Mfg. Co., D. J.
J. J. Ross Company
Ross, J. O., Engineering Corp.
Ross Paper Machy. Co.
Rotogravure Engrg. Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Valley Iron Works Co.

DRIVES

Allis-Chalmers Mfg. Co.
Appleton Machine Co.
Bird Machine Co.
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Davis, Frank H., Co.
De Laval Steam Turbine Co.
Dilts Machine Works
Downingtown Mfg. Co.
Farrel-Birmingham Co.
General Electric Company
Rodney Hunt Machine Co.
Montague Machine Co.
Moore & White Co.
Murray, D. J., Mfg. Co.
Noble & Wood Machine Co.
Pusey & Jones Corp.
J. J. Ross Company
Ross Paper Machy. Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
T. B. Wood's Sons Co.
Valley Iron Works Co.
Westinghouse Electric Corporation

DRUMS

Fibre Making Processes, Inc.

DUSTERS

Appleton Machine Co.
Downingtown Mfg. Co.
Fibre Making Processes, Inc.
E. D. Jones & Son Co.
Moore & White Co.
Noble & Wood Machine Co.
Norwood Engrg. Co.
D. J. Murray Mfg. Co.

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Calco Chemical Co.
Ciba Company
E. I. du Pont de Nemours & Co., Inc.
Geigy Co., The
General Dyestuff Corp.
National Aniline Division, Allied Chemical & Dye Corp.
Paper Makers Chemical Department, Hercules Powder Co.
C. K. Williams & Co.
Witco Chemical Co.

EMBOSSING ROLLS

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Roehlen Engraving Works

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Foster Wheeler Corp.
Goslin-Birmingham Mfg. Co., Inc.
Murray, D. J., Mfg. Co.
Swenson Evaporator Co., Div. of Whiting Corp.

FANS

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B. F. Perkins & Son, Inc.
Ross Engineering Co., J. O.

FEEDERS

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Hardinge Co., Inc.
Merrick Scale Mfg. Co.
Leeds & Northrup
Wallace & Tiernan

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Asten-Hill Mfg. Co.
Bloomfield Woolen Co.
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Draper Bros. Corp.
Huyck & Son, F. C.
Lockport Felt Co.
Mt. Vernon-Woodbury Mills, Inc.
Morey Paper Mill Supply Co.
Orr Felt & Blanket Co.
Shuler & Benninghofen
Waterbury Felt Co.
Waterbury, H., & Sons Co.

FELT CONDITIONERS

Steamaire Company

FELT GUIDES

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The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Waldron Corp., John

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Amer. Resinous Chemicals Corp.
Johns-Manville Sales Corp.
W. H. Loomis Talc Corp.
Vanderbilt Co., R. T.
Witco Chemical Co.

FILTERS

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Hardinge Co., Inc.
Moore & White Co.
J. O. Ross Engrg. Corp.
Witco Chemical Co.
Worthington Pump & Machy. Corp.

FLOORING, GRATING & TREADS

Hendrick Mfg. Co.
Klemp Co., W. F.
Norton Co.
Raybestos-Manhattan Inc.
Manhattan Rubber Division
United States Rubber Co.

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Noble & Wood Machine Co.
Oliver United Filters
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
South Wabash Engrg. Co.

FRICTION MATERIALS

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Testing Machines, Inc.
Williams Apparatus Co.

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De Laval Steam Turbine Co.
Downingtown Mfg. Co.
Farrel-Birmingham Co.
E. D. Jones & Sons Co.
Moore & White Co.
D. J. Murray Mfg. Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.
Waldron Corp., John

GRINDERS

Carthage Machine Co.
Farrel-Birmingham Co.
Lobdell Car Wheel Co.
Montague Machine Co.
Norton Company
Samuel C. Rogers and Company
The Sandy Hill Iron & Brass Wks.

GRINDING WHEELS

The Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc.
Norton Company
United States Rubber Co.

HEAT EXCHANGERS

Foster Wheeler Corp.

HEAT RECOVERY SYSTEMS

Foster Wheeler Corp.
Stickle Steam Specialty Co.

HEATING, VENTILATING AND AIR CONDITIONING

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Armstrong Machine Works
Cochrane Corp.
E. D. Jones & Sons Co.
General Electric Co.
Grinnell Company
Leeds & Northrup
D. J. Murray Mfg. Co.
Noble & Wood Machine Co.
Ross Engineering Corp., J. O.
Shartle Brothers Machine Co.
Stickle Steam Specialties Co.
Valley Iron Works Co.
Worthington Pump & Machy. Corp.

HOISTS

Appleton Machine Co.
Dilts Machine Works
Rodney Hunt Machine Co.
Ingersoll-Rand Co.
E. D. Jones & Sons Co.
Reading Chain & Block Corp.

HOSE (Air, Water, Suction, etc.)

The Cincinnati Rubber Mfg. Co.
Raybestos-Manhattan Inc.
Manhattan Rubber Division
United States Rubber Co.

WHERE TO BUY

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Spray Engrg. Company
Steamaire Company
HYDRAPULPERS
Ross Paper Machy. Co.
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N. P. Bowsher
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Cochrane Corp.
The Foxboro Company
General Electric Company
W. & L. B. Gurley
Leeds & Northrup Company
National Technical Laboratories
B. F. Perkins & Son
Taber Instrument Corp.
Taylor Instrument Cos.
Testing Machines, Inc.
Wallace & Tiernan Instrument Co.
Williams Apparatus Co.
INSULATION
Johns-Manville Sales Corp.
JOINTS
Perfecting Service Company
JORDAN FILLINGS
Appleton Machine Co.
Bahr Brothers Mfg. Co.
E. D. Jones & Sons Co.
Noble & Wood Machine Co.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.
KNIVES
Black-Clawson Company
Dilts Machine Works, Inc.
Hamblet Machine Co.
E. D. Jones & Sons Co.
Valley Iron Works Co.
KNOTTERS
Fibre Making Processes, Inc.
LABORATORY EQUIPMENT
Appleton Machine Co.
Bauer Brothers Co.
The Biggs Boiler Works Co.
W. H. & L. D. Betz
Dilts Machine Works
E. D. Jones & Sons Co.
Leeds & Northrup Company
National Technical Laboratories
Noble & Wood Machine Co.
Taber Instrument Co.
Taylor Instrument Companies
Testing Machines, Inc.
Valley Iron Works
Williams Apparatus Co.
LAY BOYS
Hamblet Machine Co.
Moore & White Co.
Shartle Brothers
LINTER COTTON
The Railway Supply & Mfg. Co.
LUBRICANTS
Gulf Oil Corporation
Gulf Refining Co.
Sinclair Refining Co.
Socony-Vacuum Oil Co., Inc.
Sun Oil Company
The Texas Company
Tide Water Associated Oil Co.
LUBRICATORS
Hills-McCanna Co.
MATERIAL HANDLING
Automatic Transportation Co.
Brooks Equipt. & Mfg. Co.
Northwest Engrg. Co.
Reading Chain & Block Company
MICROMETERS & CALIPERS
Farrel-Birmingham Co.
Montague Machine Co.
Lobdell Car Wheel Co.
Testing Machines, Inc.
Walker-Goulard-Plehn Co.
MOISTENING EQUIPMENT
The Spray Engineering Co.
Steamaire Company
MOISTURE CONTENT CONTROL
Spray Engrg. Company
Steamaire Company
Stickle Steam Specialty Co.
Williams Apparatus Co.
MOTORS AND GENERATORS
Allis-Chalmers Mfg. Co.
Continental Electric Co.
De Laval Steam Turbine Co.
General Electric Co.
Ingersoll-Rand Co.
Reliance Electric & Engrg. Co.
Westinghouse Electric Corporation
NOZZLES
Spray Engrg. Company
Steamaire Company
PACKING BOXES
Johnson Corporation
Shartle Brothers Machine Co.
PACKING
Johns-Manville Sales Corp.
The Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc.
United States Rubber Co.

PAPER MACHINES
Bagley & Sewall Co.
Black-Clawson Company
Downingtown Mfg. Co.
Thomas W. Hall Co.
Moore & White Co.
Pusey & Jones
J. J. Ross Company
Ross Paper Machy. Co.
The Sandy Hill Iron & Brass Wks.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
PAPER MACHINE SLICES
Black-Clawson Company
E. D. Jones & Sons Co.
Montague Machine Co.
The Sandy Hill Iron & Brass Wks.
Valley Iron Works Co.
PAPER MILL BUILDERS
Merritt-Chapman & Scott Corp.
The Rust Engrg. Co.
PAPER TUBE MACHINERY
Theo. Adams
Dietz Machine Works
Thomas W. Hall Co.
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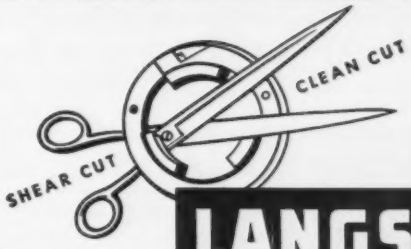

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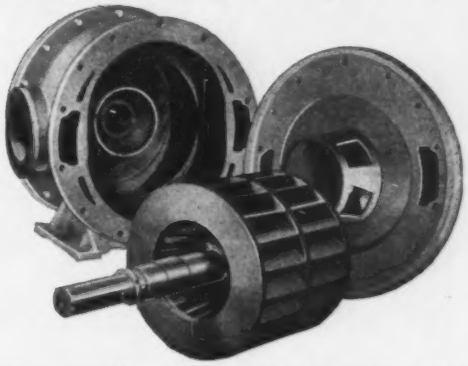

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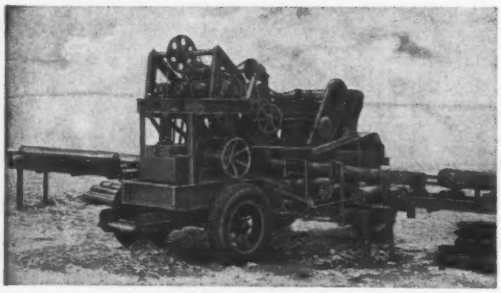

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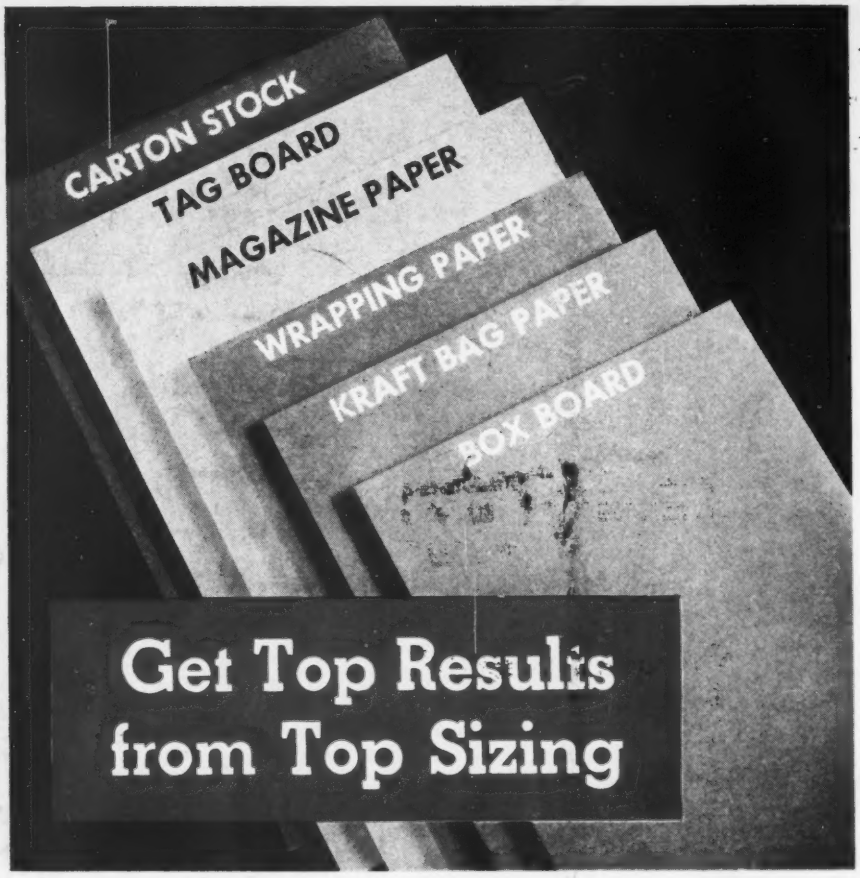

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